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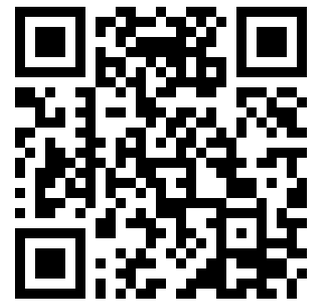

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AN ILLUSTRATED REVIEW OF PROGRESS IN ELECTRIC AND OTHER TRACTION

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THE

Tramway & Railway World

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NOTICES.

All Communications and Advertisements for next week's issue should be received not later than 3 p.m. on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

EDINBURGH CORPORATION ELECTRICITY SUPPLY.

The Lord Provost, Magistrates, and Council of the City of Edinburgh invite tenders for the supply of

Extension Steam and Exhaust Pipework at M'Donald Road Station.

The specification, general conditions, drawing, and form of tender can be obtained at the Engineer's Office, Dewar Place, Edinburgh, on Monday, July 6, on payment of a deposit of one guinea, which will be refunded on receipt of a *bonâ-fide* tender, along with the specification, general conditions, and drawing.

Tenders, endorsed "Tenders for Extension Pipework, M'Donald Road," must reach the Town Clerk, City Chambers, Edinburgh, not later than Monday, July 20, 1914.

FRANK A. NEWINGTON,
Engineer's Office, Engineer.
Dewar Place Electricity Supply Station, Edinburgh.
June 30, 1914.

CITY OF YORK.

ELECTRICITY DEPARTMENT.

TENDERS FOR 500-KW. ROTARY CONVERTER WITH TRANSFORMERS AND SWITCHGEAR.

Tenders are invited for the supply, delivery, erection and connecting up of one 500-kilowatt Rotary Converter, with Transformers and Switchgear, at the Corporation's Sub-station, Lendal Bridge, York.

Conditions of contract, specification, and form of tenders may be obtained from the undersigned, to whom tenders must be returned not later than noon on Monday, July 13, 1914.

J. W. HAME,
Engineer and Manager.
Electricity Offices, Clifford Street, York.

VICTORIAN STATE RAILWAYS.

The Agent-General for Victoria, Australia, invites tenders for the supply and delivery at the Port of Melbourne, fully inclusive of Australian Customs Duties, etc., of the following :—

Contract 25,755.—Motor-Driven Air Compressors.
Contract 26,110.—Electric Motors, etc.

Specifications, conditions of contract, and forms of tender, may be obtained by *bonâ-fide* tenderers at the offices of the Consulting Engineers, John Coates and Co., Limited, 115, Victoria Street, London, S.W.

Tenders must be delivered to the Agent-General for Victoria, Melbourne Place, Strand, London, W.C., accompanied by the preliminary deposit named in the conditions of tendering, not later than 11 a.m. on Wednesday, October 7, 1914, marked "Tender for Equipment of New Workshops—Motor-driven Compressors, Contract No. 25,755," or "Tender for Equipment of New Workshops—Electric Motors, etc., Contract No. 26,110."

The Government of Victoria does not bind itself to accept the lowest or any tender.

PETER MCBRIDE,
Agent-General for Victoria.

COUNTY OF LONDON.

The London County Council invites tenders for the construction of One, Two or Three (as may be ordered by the Council) Electrically-Driven Chassis, to carry turntable ladders for the use of the London Fire Brigade.

The specification, form of tender, etc., may be obtained from the Clerk of the Council at the County Hall, Spring Gardens, S.W., after payment to the Cashier of the Council of 10s. This amount will be returnable only if the tenderer shall have sent in a *bonâ-fide* tender, and shall not have withdrawn the same. The contract documents may be inspected before the payment of the fee.

The person whose tender is accepted will be bound by the contract to pay wages at rates not less, and to observe hours of labour not greater, than the rates and hours set out in the Council's list. Particulars of the Council's Standing Orders as to its conditions of tender and contract are given in every issue of the *London County Council Gazette*. No tender received after 11 a.m. on Monday, July 13, 1914, will be considered. The Council does not bind itself to accept any tender.

LAURENCE GOMME,
Clerk of the London County Council.
County Hall, Spring Gardens, S.W.,
June 17, 1914.

CITY OF TRURO.

ELECTRIC LIGHTING.

Electrical contractors who are desirous of tendering for the proposed Municipal Electric Light Undertaking for the City of Truro should send in their names to the undersigned not later than Saturday, the 4th of July.

The contract will be divided into two parts :—

(*a*) Plant, consisting of Suction Gas Plants and Engines, Dynamos, Booster, Balancer, Switchboard, Battery, Instruments and Accessories.

(*b*) Mains, consisting of Overhead Equipment, Steel Poles and Accessories, Bare Copper Conductors, Public Light Fittings and Fixtures and the like.

Contractors are at liberty to quote for either or both of the above sections.

Forms of tender and schedules, general conditions and specifications will be supplied after the 4th of July on application to the undersigned on payment of a deposit of £3 3s. for each section of the work, such deposit to be refunded on receipt of a *bonâ-fide* tender accompanied by fully priced out schedules being duly lodged.

The lowest or any tender need not necessarily be accepted, and all tenders are subject to the grant of the proposed loan by the Local Government Board.

FREDERICK PARKIN,
Dated Truro, June 27, 1914. Town Clerk.

PARISH OF ST. GILES, CAMBERWELL.

STEAM TURBINE-DRIVEN CENTRIFUGAL PUMPS.

The Guardians of the Poor of the Parish of St. Giles, Camberwell, are prepared to receive tenders for the supply to their Infirmary, Brunswick Square, Camberwell, S.E., of Two Steam Turbine-Driven Centrifugal Pumps for circulating hot water, capable of delivering 25,000 gallons of water per hour against a differential head of 20ft.

Further particulars can be obtained from the Engineer at the Infirmary, between the hours of 10 a.m. and 12 noon.

Forms of tender can be had upon application at these Offices, and the same must, when duly completed, be returned to me, marked "Tender for Centrifugal Pumps, etc.," not later than 6 o'clock p.m. on Wednesday, July 8, 1914.

Canvassing the Guardians, either directly or indirectly, in respect of this tender will be deemed a disqualification.

CHARLES S. STEVENS,
Clerk to the Guardians.
Guardians' Offices, 29, Peckham Road, S.E.,
June 29, 1914.

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FOR SALE.

CITY OF LEEDS.

ELECTRIC LIGHTING DEPARTMENT.

Important sale of second-hand Boilers, Engines, Alternator, Pumps, Pipes, etc.

Offers are invited for the purchase of Second-Hand Plant, as follows :—

Four Lancashire Boilers (by Daniel Adamson and Co.), 30ft. by 8ft. 6ins., insured for 160lbs., with Bennis Stokers and Superheaters.

One Water Tube Boiler (by Babcock and Wilcox); heating surface, 4,000 square feet; insured for 160lbs.; with Mechanical Stoker and Superheater.

One Green's Economiser, 288 tubes, insured for 191lbs.

Three 1,000 i.h.p. Engines (by Belliss and Morcom), vertical compound, six cylinders, three cranks, condensing or non-condensing, pressure 125 to 160lbs.

One 500 i.h.p. Engine (by Belliss and Morcom), vertical compound, six cylinders, three cranks, condensing or non-condensing, pressure 125 to 160lbs.

coupled to

One 300 Kilowatt Alternator (by the Electric Construction Co.), two-phase, 50 cycles.

Feed Pumps, Coal Elevator, Coal Conveyor and a large quantity of auxiliary machinery.

Steam and Water Pipes.

34 Hopkinson's Valves.

A 10-Ton Overhead Travelling Crane.

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Offers will be considered for the whole or any part of the plant, and it is to be removed immediately upon sale.

Leave to inspect and all other information may be obtained from Mr. C. Nelson Hefford, Manager of the Electric Lighting Department, 1, Whitehall Road, Leeds, to whom also offers are to be addressed.

July, 1914.

POSITIONS VACANT.

FOREMAN PLATELAYERS.

Wanted, Two Working Foreman Platelayers, permanent job. Apply, giving particulars of experience, and wages required, Engineer and Manager, Rhondda Tramways Company, Limited, Rheola Road, Porth (Glam.).

(Continued on page 7.)

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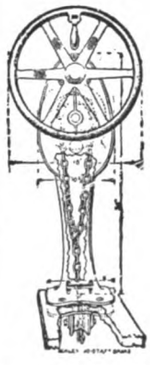

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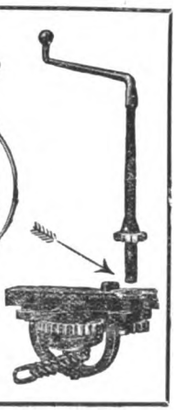

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SATURDAY, JULY 4, 1914.

THE "OCEAN"

ACCIDENT AND GUARANTEE CORPORATION, LTD.,

IS THE

PREMIER INSURER OF TRAMWAYS

HEAD OFFICE:

MOORGATE STREET, LONDON, E.C.

SHEFFIELD OMNIBUS AND ROAD MAINTENANCE.

Last week we referred to the undertaking given by the President of the Local Government Board that a Joint Committee of both Houses of Parliament will be appointed to consider whether there should be a general obligation put on the owners of trackless trolley cars and motor omnibuses to contribute to the cost of the maintenance of the roads on which the vehicles run. Since then has come an important decision by the Local Legislation Committee of the House of Commons, in the case of a Bill promoted by Sheffield Corporation, to enable that body (among other things) to run motor omnibuses on seven routes outside the city boundaries. The two County Councils concerned —those of the West Riding of Yorkshire and Derbyshire— naturally objected unless the Corporation were prepared to pay part of the cost of extra road maintenance necessitated by the wear caused by the omnibuses. But the Corporation flatly refused, although for some time it has been clear that in cases of this kind promoters would have inevitably to pay something to the road authority concerned. After all the pros and cons had been thrashed out before the Committee, that body put off giving a decision for no less than a week, in order to have full time for deliberation. On Wednesday last Mr. Middlebrook, the chairman, announced the finding. He showed how the complexity of the matter was increased by the facts that there is to be a general inquiry by a Joint Committee, and that it is probable State subventions will soon be given to local authorities for main road maintenance. His Committee, however, could not wait for these things, and they accordingly now decided in favour of the counties. Three-eighths of a penny per mile run is to be paid by Sheffield to the counties for the first three years (being the same rate as in various other cases), and thereafter the amount is to be settled by agreement or arbitration. In the event of arbitration, Sheffield will pay half the amount of the extra cost of upkeep due to the omnibus service. If State grants are subsequently made, Sheffield's contribution is to be lessened, and if the State grant comes to half the upkeep cost, then Sheffield will go free. The decision appears to be a fair one to all parties; there is an immediate charge to meet immediate requirements, and there is full provision for equitable revision when experience has been obtained. The County Councils think that three-eighths of a penny is not enough, but time—and the arbitrator—will show. No doubt, when the Joint Select Committee begin their inquiry, much will be heard of the Sheffield case and others, with the London great western road case in a class by itself. These precedents, however, and also the instances where companies or local authorities have had to pay for road maintenance in respect of trackless trolley cars, though they raise the question of principle, are small commercially by comparison with the interests which will be involved in connection with omnibus traffic in the metropolitan area. They are also small when compared to the important issues involved in the motor lorry and traction engine traffic of the manufacturing districts. All these aspects will doubtless be considered and dealt with in the course of the two inquiries which the Government have promised.

THE HARASSED TRAMWAY.

Clear thinking is not a characteristic of some of our motor contemporaries. Like the political newspaper, their object precludes fair reasoning on certain topics, and their tendency at times is to make the "worse appear the better reason." It is the more satisfactory, therefore, to find that the "Commercial Motor" wishes the facts in regard to the tramway deficit to be made clear. It alludes to the unremunerative working-men's fares, and says that it desires the economic aspect to be appreciated. The economic aspect is, of course, that these fares entail a greater loss on the tramway than the amount of the deficit. In other words, were the L.C.C. tramways not compelled to carry a vast number of passengers at less than cost, the undertaking would prove even more profitable than it is; and, considering the large proportion of loans paid each year, the system, if regarded as an ordinary commercial undertaking, is in an excellent position. Economically, of course, it is wrong to saddle the system with unremunerative work. If the community wish to make an annual contribution to partly cover the cost of carrying workmen by tramway, it ought properly to be done independently of the tramways. Let a lump sum be voted by the Council for the purpose, and let such a sum be paid to the tramways as will meet the difference between the fares paid by workmen and the cost of their carriage. We shall then not hear so much nonsense talked about the financial position of the London tramways. Later, of course, the tramways will be relieved to an equitable extent of the burden of providing a free permanent-way for motor omnibuses and other traffic. To-day the tramways not only provide many passengers with services at less than cost, but they provide the community with no inconsiderable part of the roads. As a reward for this eleemosynary assistance the tramway is reviled as an uneconomical system, effete and obsolete to the last degree. We have no sympathy with attacks on motor omnibuses or tramways as such. It does not in the least matter how the public are carried, provided they are carried in the cheapest and most efficient

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way, all things considered. Of course, the motor omnibus is in certain circumstances a more convenient vehicle than the tramcar—so is a motor brougham; but neither the brougham nor the omnibus are practical vehicles when such enormous masses of people have to be carried promptly, as is the case during the rush hours in London and every other great city. This is not a question for argument; it is one of fact. A continuous stream of motor omnibuses could not carry the crowd. Withdraw the tramcars at the rush hours, and the offices of the motor omnibus companies would be mobbed, because of their failure to meet the demands. In the circumstances, it is folly to talk of the tramway as unnecessary or antiquated; at present it is neither. The public simply could not conduct their daily occupations without it. It cannot, however, be expected commercially to achieve the impossible; to carry passengers at less than cost, to provide roads for competitors, and on top of all to pay wages above market rates.

THE "DEFICIT" ON LONDON TRAMWAYS.

MOTOR OMNIBUS COMPETITION.

A long report on the accounts of London County Council tramways for the year ended March 31 last was presented by the Highways Committee at last Tuesday's meeting of the Council. After meeting working expenses, interest and sinking fund, there is a deficit of £88,526, and the report discusses the situation at length, makes comparisons with the finance of motor omnibuses, and refers to methods for meeting the competition. The following is an abstract:—

The tramways system on March 31 extended over a total length of 148½ street miles, being 140½ miles of electric lines and 8 miles of horse lines.

The total income from the undertaking during the year and the working expenses were as follows:—

	Electric traction.	Horse traction.	Total.
Income	£2,247,043	£21,626	£2,268,668
Working expenses ...	1,585,251	30,215	1,615,466
Surplus on working ...	£661,792	£8,589 (deficiency)	£653,202

The under-mentioned charges have to be set against the surplus on working:—

Interest (gross)	£328,110	
Sinking Fund	408,488	
		£736,598
Income tax (Schedule D) in addition to property tax included in working expenses		28,197
Parliamentary expenses, etc. ...		2,086
		£766,881
Less—tax deducted, etc.		25,153
		£741,728
Deficiency (to come from general reserve fund)		£88,526

The deficiency will be met by a transfer from the reserve fund. That fund on March 31, after meeting the deficiency, amounted to £190,597. There is no sum available for the renewals fund, which now stands at £539,749.

The total operating expenses for electric traction were £1,585,251, including £6,053 for special charges, or 6.50d. a car mile run, as compared with 6.62d. a car mile in 1912-13. The total working expenses in connection with horse traction amounted to £30,215, or 11.39d. a car mile run.

The total receipts in respect of electric traction amounted to £2,247,043, or 9.21d. a car mile, as compared with 10.04d. for 1912-13. From lines operated by horse traction the total receipts amounted to £21,625, or 8.15d. a car mile, as compared with 8.73d.

The total number of passengers carried and of car miles run during the year were as follows:—

	Electric traction.	Horse traction.	Total.
Number of passengers ...	516,338,859	6,613,781	522,952,640
Number of car miles run ...	58,572,356	636,933	59,209,289

The capital expenditure on the undertaking up to March 31 amounted to £13,028,119, of which £409,277 represents expenditure during the year 1913-14. The net debt on March 31 was £9,923,528.

FINANCES AND PROSPECTS—REASONS FOR PRESENT POSITION.

The Committee in giving their views on the present position the undertaking state that many lines which have been electrified in recent years are not of a highly remunerative character. Some of the lines recently taken in hand have not only proved exceedingly costly to reconstruct, but owing to the many difficulties encountered during the process of the work the lines had to be closed for traffic for considerable periods. The tramways suffer to a very serious extent through not being able on many of the routes to carry passengers to their desired destination. The Committee now have under consideration a comprehensive scheme for the linking up of the present tramway system and the extension to proximate traffic points.

Above all there is that new factor—the very great increase in the competition from the motor omnibus undertakings. In June, 1912, it is estimated that 280 motor omnibuses were run daily along the routes of the tramways, while in June, 1913, the number had risen to about 750.

STEPS TAKEN TO IMPROVE THE POSITION OF THE UNDERTAKING.

The Committee attach the greatest importance to the consolidation and linking up of the present tramways. Other steps taken and contemplated affect the arrangement of the car services and fares and the provision of better travelling facilities which will enhance the popularity of the tramways. During the last few months a very large number of return fares at reduced rates have been instituted, while transfer facilities have been introduced on several routes. The Board of Trade has recently agreed to trailer cars being run on several routes on the southern system, and tenders for the necessary cars will be received on June 30. Other steps which have been taken include the speeding up and improved regulation of the car services, and the provision by means of junction lines of alternative routes to avoid congestion. Further arrangements were made during the past year for through running with outside tramways undertaking, while additional through services will no doubt be instituted during the present year.

MOTOR OMNIBUS COMPETITION.

In submitting the comparison contained in this report, the Committee have made use of the figures of the London General Omnibus Company. In attempting to make a comparison, two all important facts should be borne in mind. First, practically the whole of the tramways are subject to most severe competition from the omnibuses, while the omnibus companies are able to operate on a very large number of routes where there is a heavy all day traffic and almost no competition. Second, passengers using the tramcars have on very many routes to change into another vehicle to reach their destination in the central area, a circumstance which militates very much against the tramways.

The motor omnibus companies are not liable, as the Council is, to pay rates for the occupation of the road. The amount paid by the Council under this head in 1913-14 amounted to £86,337, and represents an average relief to the rates of over ½d. in the £. Further, very considerable expenditure has been incurred by the Council in connection with the construction and maintenance of paving along the tramway routes which would have to be borne by the road authorities if no tramways had been constructed. It is estimated by the Council's officers that the annual saving to the road authorities in consequence of this obligation amounts on the present mileage to about £128,000. It is estimated that the extra cost of bituminous grouting to the paving of the tramway tracks necessitated by the damage done by motor omnibuses and other rubber tyred vehicles amounts at present to £20,000 a year.

There is the further point that the tramways account is charged with a considerable portion of the cost of effecting improvements where these are carried out along tramway routes. The amount chargeable to the tramways account in this respect is £800,575, of which £652,067 has already been so charged up to March 31.

The total amount actually charged to the tramways account during the year 1913-1914 in respect of rates on tracks and buildings (£124,259), repair of the permanent way (£104,801), and street widenings (£31,168), was £260,228, and the rates were therefore relieved to this extent.

The following table shows, as nearly as can be calculated, the relative extent to which contributions in respect of the two means of conveyance are made towards the public funds:—

	Per omnibus	Per tramcar
Licences—	£ s. d.	£ s. d.
Stage carriage licence (police)	2 0 0	2 0 0
Motor car licence	3 3 0	Nil
Local taxation licence (carriage duty or wheel tax) ...	0 15 0	0 15 0
Registration (one-fifth of the fee, which is not an annual charge)	0 4 0	Nil
Driver's licence fee under Motor Car Act §	0 7 6	Nil
Driver's police licence and conductor's police licence §..	0 15 0	0 15 0
	7 4 6	3 10 0
Rates and maintenance of roads—		
Rates on permanent way	Nil	†65 0 0
Maintenance of tramway tracks and margins	Nil	†96 0 0
Other duties and charges—		
Petrol tax	‡30 0 0	Nil
Debt charges on contribution to street widenings... ..	Nil	‡23 0 0
	37 4 6	187 10 0

§ Three licences for every two vehicles in service.
† Calculated on number of vehicles in service in 1913-14.
‡ This figure is approximate, and is based on the best information obtainable.

If the present contributions to public funds are worked out per £100 of gross receipts, the amounts are approximately £2 6s. in the case of the London General Omnibus Company, and £11 1s. in respect of the Council's tramways.

If the London General Omnibus Company had been called upon to pay ¾d. an omnibus mile (as has been done in other cases) its contributions towards public funds would have been increased to £107 per omnibus and approximately £7 per £100 of gross receipts. The expenditure incurred by the Council in respect of the maintenance of the tramway tracks during 1913-14 was .418 a car mile. If there were no adjustment made of the existing burdens and tramcars were superseded entirely by motor omnibuses the increased expenditure falling upon the rates on the basis of the present traffic would be equivalent to a rate of 1½d. in the £.

If the London General Omnibus Company had been called upon to pay ¾d. an omnibus mile for road repairs necessitated by its

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heavy traffic, the total expenses (including interest and redemption of debentures and income bonds) would have been increased from 8.02d. to 8.4d. an omnibus mile, which would show a margin of receipts over expenses of only .1d. per omnibus mile.

The following table shows as nearly as can be ascertained the results of working tramcars (1913-14) and motor omnibuses (1913) if the contributions towards public funds in respect of motor omnibuses were equivalent to the contributions in respect of tramcars on the basis of the same amount being charged against motor omnibuses per omnibus mile as it is now charged against tramcars per car mile :—

If equivalent contributions were made.	Tramcar.	Omnibus.
Total receipts	£2,247.043	£3.258.198
Working expenses	1.585.251	3,245.633
Surplus on working	661.791	14.568
Return on total capital expenditure ...	6.07%	.46%

If the tramways had been run by other than public authority, and the financial arrangements had followed those ordinarily adopted by a trading company, the surplus on working for 1913-14 might have been apportioned as follows :—

Surplus on working	£661.791½
Less provision for renewals (¾d. per car mile)	165.208
Available for dividends	496.583

This sum of £496,583 represents a payment of over 5½ per cent. on the net debt outstanding.

One other factor which has an important bearing is the question of workmen's fares. The omnibus companies provide no facilities in this respect. On the other hand, the Council provide workmen's car services on practically all routes at a fare of a 1d. single and 2d. return for journeys of as much as 9½ miles in each direction. 52,754,604 passengers travelled in workman's cars in 1913-14.

A most important consideration is the relative capacity of the two systems to carry large numbers of passengers during the busy hours of the day. It is not generally known that almost the same number of omnibuses are run during the slack hours as during the busy hours of the day. This lack of expansion of the omnibus service to meet the requirements of the busy hours is not an accidental or temporary condition; it is the economic basis of the system. The whole of the capital expenditure involved in a motor omnibus service is the cost of the omnibuses and the garages, and the capital required consequently increases as the number of omnibuses increases. It is on that account uneconomical to provide omnibuses for the busy hours only, and this is the dominating factor which prevents omnibus companies from running additional omnibuses during these hours.

Compare with this the facilities afforded by the tramways to meet the varying requirements of the traffic. During the slack hours the tramcar carries very much the same number of passengers as is carried by the omnibus at the same hours; but when the traffic demands it the tram provides 78 seats as compared with 34 by the omnibus. Then the service of trams is greatly increased during the busy hours—namely, by at least 40 per cent. on every route while it is doubled or more than doubled on some.

ADVANTAGES RESULTING TO THE PUBLIC FROM THE USE OF TRAMCARS.

The omnibuses are run over a very large area inside and outside the county, and their mileage is considerably greater than that of the tramways. The total number of passengers carried by the London General Omnibus Company in the year 1913 was 580,205,335, at an average fare of 1.32d. a passenger. The total number of tramway passengers on electric cars in 1913-14 amounted to 516,338,859, carried at an average fare of 1.01d. a passenger. If the tramway passengers had been carried at the average fare charged by the London General Omnibus Company, the public using street conveyances would have had to pay an additional sum of £658,587 for travelling facilities. On the other hand, if all these omnibus passengers had been carried by tramcar at the average fare of 1.01d. a passenger, a saving to the travelling public of £740,048 would have been effected.

At the Council meeting a long discussion took place on the situation, and on the estimates for the current year which anticipate a deficit of £46,682. Sir John Benn moved to add to the estimates resolution that it should be referred to the Committee to prepare a complete scheme for the abolition of dead-ends and for extensions. Mr. G. A. Hume said that a technical committee had been appointed to study the problem. The future was with the tramway, and he thought they might go forward with every confidence. In the end the amendment was defeated.

Oldham, Ashton and Hyde Tramways.—The concession of the Oldham, Ashton and Hyde Tramways Company is nearing its end, and the local authorities concerned are considering the question of the purchase of the undertaking. The Denton District Council has suggested that the local authorities through whose districts the lines run should meet, and have asked the Ashton and Hyde Councils to appoint representatives to attend a meeting at Denton on Wednesday, July 8.

Liverpool Tramways Festival.—The Liverpool tramways attracted a crowd of 4,000 people to their two days' meeting on the grounds off Green Lanes. The entries were more numerous than usual, and a number of prominent athletes competed. Sir Charles and Lady Petrie were present, as well as Alderman Fred Smith and Major Clarke, the chairman and vice-chairman of the Tramways Committee, and many other members of the City Council. The Tramways Band played during the meetings; amongst the supplementary features were maypole and national dances, performed by children of the tramway employees.

SHEFFIELD OMNIBUSES AND COUNTY ROADS.

CITY TO CONTRIBUTE TO MAINTENANCE.

The Local Legislation Committee of the House of Commons, presided over by Mr. Middlebrook, on Wednesday gave their considered decision on the question whether Sheffield Corporation should be obliged to contribute towards the cost of maintenance of roads in adjacent counties over which it was proposed that the Corporation should run motor omnibuses. In last week's issue it was mentioned that in connection with the bill promoted by Sheffield Corporation seeking power to run the omnibuses, the Committee had heard evidence and arguments at great length on this subject of contribution. The Corporation's contention was that there should be no charge upon them, while the West Riding and Derbyshire County Councils contended that a substantial contribution should be made. Although a similar point has been decided in several other cases in favour of a contribution being made, the Committee considered the matter of such importance that on Wednesday last week they postponed their decision, and took until Wednesday of this week before announcing their conclusion.

The chairman, in intimating the decision of the Committee, referred to the great complexity of the question and the variety of interests concerned. The complexity had been aggravated by the announcement made by the President of the Local Government Board that a Joint Committee of both Houses of Parliament was to be appointed to consider the whole problem of whether contributions to road maintenance should be paid by the owners of motor omnibuses and trackless trolley cars. The Committee, however, could not wait for that, but must give their decision as best they could. They would sanction four of the seven omnibus routes proposed by the Bill, these four all going outside the city boundary.

On the question as between Sheffield and the opposing County Councils he said it was almost impossible to put into figures, apart from the question of deciding the principle whether there should be any contribution or no contribution, what would represent for the present and for a considerable period in the future, any adequate payment for the additional wear and tear which would follow on the omnibus traffic. The Committee had, however, come to the conclusion that Sheffield should contribute ¾d. per omnibus mile, that figure to be subject to revision either by agreement between the parties or in the event of failure to agree, by arbitration at intervals of three years. The view of the Committee was that the Corporation should contribute after the first three years, in the event of arbitration, 50 per cent. of such amount as the arbitrator might decide to be the extra cost of up-keep of roads due to the motor omnibus service. As to whether any Imperial grant should be taken into account in arriving at the amount which the Corporation should contribute, he said that in the view of the Committee if such a grant should amount to one quarter of the total cost of up-keep the contribution of Sheffield should then be only one-half of what might be found to be the figure in the absence of any Imperial contribution. In the event of the State grant amounting to one-half the cost of maintenance Sheffield's contribution would cease. The Committee would suggest in their report that Parliament should lay down a general principle to apply to the whole country.

MISCELLANEOUS NEWS AND NOTES.

Cliff Tramway at Whitby.—It is proposed to construct a cliff tramway at Whitby, which will provide a more convenient means of reaching the beach.

Removal of Sludge from Conduits.—During the twelve months ended January 21, 1914, the cost of the removal of sludge from the conduits on the London County Council tramways amounted to £6,471, the work having been done by contract.

London County Council Tramway Extension.—An extension of the London County Council electric tramways in New North Road was opened on June 25. The work has necessitated the rebuilding of the canal bridge in New North Road, the widening of East Road, and alterations at Highbury Corner.

Record for Newcastle Tramways.—During the races at Gosforth Park and the fair at Chesham Vale, the Newcastle tramways established another record. From Saturday, June 20, to Thursday, a sum of £8,000 was taken. This is larger than the receipts of any other race week since the electrification of the system.

New Chairman of the B.E.A.M.A.—At a meeting of the Council of the British Electrical and Allied Manufacturers' Association, held at 36, Kingsway, W.C., on June 25, Mr. F. R. Davenport, managing director of Willans and Robinson, Limited, was elected to the office of chairman of the Council, recently rendered vacant by the death of Mr. A. Bruce Anderson.

Edinburgh Corporation and Colinton Tramways.—The Tramway Committee of Edinburgh Corporation had submitted to them on June 24 a memorandum of the terms proposed by the Colinton Tramway Company as to the proposed transference of their undertaking to the Corporation in the event of the latter agreeing to purchase. The proposed terms included the taking over of the obligations of the company to the War Office, the landowners, etc. There was also submitted an alternative suggestion that there should be a joint working agreement. The committee unanimously agreed to reject the proposals on the ground that they were totally unacceptable, and they also resolved to suspend negotiations with the Colinton Tramway Company until the block on the progress in Parliament of the Electric Lighting Confirmation Provisional Order is removed.

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The British Westinghouse Company.—The works at Trafford Park, Manchester, will be closed from July 24 to August 4 for the annual holidays. Goods cannot be despatched between these dates, but urgent business will receive attention.

Insurance of Electric Vehicles.—In the case of electric vehicles, the Car and General Insurance Company has agreed to give a 15 per cent. rebate off its tariff for petrol vehicle insurance. Later it proposes to increase the preference by an additional 5 per cent.

Canopy Top Cars for Leicester.—The Tramways and Electricity Committee find that cars with canopy tops are much better for meeting the demands of the public than those without, and they have decided to put covers on 75 per cent., or 47, of their present cars. The estimated cost is £101 10s. per car for the manufacture and delivery of the canopies. These will be fixed by the Corporation workmen at the car shops.

Belfast Corporation Tramways.—In referring last week to the knighthood conferred on Mr. J. F. C. Snell, it was inadvertently stated that he was engaged in advising Belfast Corporation in reference to tramway extensions. It is not, of course, tramway matters in any aspect that Sir John is considering for the Corporation, but the work of the electrical undertaking, as has already been reported in these columns.

Track Maintenance at Walthamstow.—In a report which the Light Railway Committee recently received from the engineer as to the condition of the tramway track in a part of Chingford Road, the estimated cost of doubling this part of the track is £3,039. Of this amount £800 would have to come out of revenue on account of superseded work, and the balance would be raised by loan. The committee recommended that application should be made to the Board of Trade for the purpose.

Tramways Extension in London.—At the meeting of the London County Council on Tuesday the recommendations of the Highways Committee were approved for the construction on the conduit system of the tramway in Seven Sisters Road (acquired from the Metropolitan Electric Tramways) at a cost of £10,450; and for a third tramway track to be laid in Blackfriars Road at a cost of £3,500, and a lay-by in High Street, Plumstead, at a cost of £1,115. The consideration of the proposal for the construction of a tramway in High Street and East Hill, Wandsworth, at a cost of £16,000, was postponed.

Energy Consumption at Bury.—In his annual report, Mr. W. Clough, general manager of the Bury Corporation tramways, remarks that as regards the use of electrical energy on the cars, the "rock-bottom" now seems to have been reached. In 1910 the cost under this heading for the Bury and Radcliffe tramways was £10,280. Last year the cost has been reduced to £7,476, although there was an increase of 108,747 car miles. The units per car mile have successively decreased since 1910, when the consumption was 1.792 units, while in 1914 it was 1.252 units. The average for the four preceding years was 1.453 units.

Transfer Modifications at Southampton.—Report has been made by the manager of the tramways that the present method of dealing with the transfer stages was most unusual and unsatisfactory, the difficulty of properly checking their use being increased by the fact that practically the whole of the penny stages were transfer stages. While not desiring to interfere with what he termed the true transfer stages, he advocated an alteration in regard to the power of transferring on routes where through services existed. He did not believe that such power of transference was allowed on any other tramway undertaking, and if it was abolished an efficient ticket system could be operated with nine different tickets in place of the present 18. The proportion of penny passengers who transferred was only 11½ per cent. The Council have adopted the manager's suggestion.

Manchester Municipal Thrift Scheme.—Mr. J. M. McElroy was a member of the deputation which recently waited upon Mr. Herbert Samuel, President of the Local Government Board, with reference to a superannuation scheme for municipal officers. Addressing Mr. Samuel, Mr. McElroy said that as general manager of the Manchester City Corporation tramways he could speak for one of the greatest provincial committees and also for one of the newer departments of municipal life—viz., the tramways department. "In Manchester," he continued, "we have some 5,000 employees, and therefore I have had considerable experience in dealing with questions of this character. We have in my city a thrift scheme whereby the officers contribute 3⅜ per cent. of their salary and the Corporation 1¼ per cent. In addition, the Corporation add interest at the rate of 4 per cent. The officers draw their allowance at the age of 65, or in the case of incapacitation earlier. At the present time the Corporation is considering the question of turning this thrift scheme into a superannuation scheme."

The Institution of Civil Engineers.—The first conversazione held in the new premises took place on Thursday last. The President, Mr. Anthony G. Lyster, received such a number of guests that the spacious premises were crowded in every part. In three of the rooms engineering models and scientific apparatus were displayed, and proved of such interest that it was difficult to get near some of them or to hear the explanations of the talented exhibitors who, in many instances, attended in person. Corrugated rails taken from different sections of the L.C.C. tramways were shown by Mr. A. L. C. Fell, the general manager; the lighting equipment of a "National" steam omnibus and a grate section showing rocking-bars and coke-feeders of the new coke motor in action, by Mr. Thomas Clarkson; and a Wimperis recording accelerometer and equilibristat with a pocket size indicating accelerometer, by the inventor, Mr. H. E. Wimperis.

CONTRACTS AND ORDERS.

The Titan Trackwork Company, Limited, have received an order from Warrington Corporation.

Belfast Corporation have accepted the tender of the British Westinghouse Company at £2,003 for a 1,000 kw. rotary converter.

Messrs. J. Williamson and Company's tender for the supply during 1914-15 of cast iron plough shares has been accepted by the London County Council. The expenditure is estimated at £350.

The British Westinghouse Company's tender for a 5,000 kw. turbo-alternator at £14,137 has been recommended for acceptance by the Salford Corporation, together with their tender for an auxiliary turbine air pump at £709 14s.

PERSONAL.

Mr. Walter Brown, M.A., B.Sc. (Eng.), A.I.E.E., of Glasgow, has been appointed lecturer of engineering in the University of Hong Kong.

Mr. T. R. Whitehead, manager of the Coventry Corporation tramways, has been recommended by the Tramways Committee for an increase in salary from £450 to £500 per annum.

Mr. W. Dundas, a member of the Manchester Corporation electricity department's staff, has been appointed resident engineer at the Dickinson Street and Bloom Street generating station.

Mr. A. C. Levis, managing director of the British Thomson-Houston Company, has been elected an ordinary member of the Council of the B.E.A.M.A., in place of the late Mr. A. B. Anderson.

Mr. Edgar Barralet, of Messrs. Pinchin, Johnson and Company, has undergone an operation for appendicitis. Our readers will be glad to hear that he is progressing as favourably as can be expected.

Mr. Harold Collins, the new borough engineer and surveyor of Colchester, began his career as a pupil with his father, the present city engineer of Norwich. Subsequently he served as assistant to the resident engineer of the Lancashire and Yorkshire Railway, and he next became assistant to Mr. Wakelam, county engineer of Middlesex, at the time of the construcion of the Council's tramways. Since 1903 he has been deputy city engineer of Norwich.

Sir George White, speaking at the annual meeting of the Imperial Tramways Company on June 26, said, "The day has gone by when the owners of tramways can hope to meet the public requirements by means of tramcars alone, and our experience in Bristol shows that, notwithstanding the smaller carrying capacity of the motor 'bus, the receipts per mile for the whole of last year in city and country regular services alike actually equalled the receipts per mile of the tramcars."

Tramways Congress at Budapest.—The following have been appointed delegates from Glasgow and Leeds Corporations to the congress of the International Tramways and Light Railways Union which, as already announced, will be held at Budapest from September 7 to 12:—Glasgow: Bailie Robert Kirkland, convener of the Tramways Committee; and Mr. Jas. Dalrymple, general manager. Leeds: Mr. Alderman Smithson, chairman; Mr. Alderman Brown, deputy-chairman; and Mr. J. B. Hamilton, general manager.

FINANCIAL REPORTS AND MEETINGS.

Plymouth Corporation Tramways have reported a very successful financial year. For the twelve months ended March 25 the income amounted to £40,880, an increase of £1,800, while the net profit at £4,037 is an increase of £1,400.

Millars' Timber and Trading Company, Limited.—The twelfth annual report covering the year ended December 31 last shows that the share capital remains at £1,700,000. Further amounts of debenture stock have been cancelled for the purpose of the sinking fund, and the amount now outstanding is £251,899. The balance of profit for 1913 is £181,669, and including £29,201 brought forward from 1912 there is a total amount available for distribution of £210,870. Debenture interest requires £21,664, and £50,000 has been carried to depreciation reserve account. Out of the balance the directors recommend a dividend of 6 per cent. on the ordinary shares to be paid on September 30 next, amounting to £51,000, leaving £37,206 to be carried forward.

First Year of the Universal Penny Fare at South Shields.—Mr. W. T. Robson, general manager of the Corporation tramways, in his annual report, states that the outstanding feature was the striking success of the alteration of fares made at the beginning of the twelve months. The abolition of the fare stages had been an immense boon to the users of the cars. The average journeys per head of the population per annum had increased from 76 to 90. The system was one peculiarly suited to a fixed penny fare. The maximum distance possible for one penny was 3.1 miles, a figure which would bear comparison with any other town in the country. The year had been the most successful yet experienced. The net surplus amounted to £7,106, an increase of £788. The revenue was £38,330, an increase of £4,178, while the passengers carried totalled 10,005,164, an increase of 1,548,476. Naturally, the working expenses had also increased, this being due to heavy repairs, particularly to rolling stock. In spite of this increase, the total operating costs per car mile worked out at the very satisfactory figure of 6.03d., which would be found to be amongst the lowest in the country.

Ipswich Tramways.—In his annual report Mr. Frank Ayton, manager and engineer of the tramways, states that the revenue for the year was slightly greater than in the previous year. The

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increase amounted to £421, or 1.8 per cent. The working expenses showed an increase, however, of £2,472, or 14.2 per cent. After making provision for capital charges and sinking fund, there is a deficit of £1,828. This is met by a surplus of £1,322 brought forward from the previous year (which was made up of an unused balance of a rate in aid in the year 1911-12, plus a small surplus produced in 1913) and a debit balance of £506 carried forward. A great portion of the rate in aid, 1911-12, was devoted to the relaying of the rails. During the past year the cost of track maintenance has been heavy as the manganese steel points had in many cases reached the end of their useful life. Mr. R. F. Jackson, speaking on the report in the Town Council, said that the committee were to be congratulated on the year's work. In the electric light supply undertaking the town had a splendid asset, and the tramways would be a good asset when made more popular. He noted with satisfaction the increase made in the salaries in the department from the manager downwards. When the last request came for an increase for the manager he gave it his whole-hearted support and in a similar occurrence he would do the same.

Rochdale Corporation Tramways.—The Tramways Committee in their report for the year ended March 31, 1914, allude to the appointment on July 16, 1913, of Mr. George Webster as general manager in succession to Mr. J. S. D. Moffet, who had resigned on his appointment as general manager of the West Ham tramways. During the year the maximum rates of pay were increased by ½d. per hour for all inspectors, motormen, conductors, cleaners, etc., and the concession of time and a quarter for work on Christmas Day and for all time over 11 hours per day was granted. The expenditure on permanent way shows an increase of £855 on the previous year, which is attributed largely to the wear on the paving in the margins caused by heavy motor traffic, and this continues to be serious. Several pairs of points have been badly worn, and will require renewal during the coming year. The committee have recommended the construction of an additional car shed with workshop accommodation at a cost, including equipment, of £17,000, and application has been made to the Board of Trade for sanction to borrow this amount. The summary of the accounts is as follows :—

	£.	Average per car mile. d.
Traffic revenue	82,878	11.123
Sundry revenue	298	.040
	83,176	11.163
Traffic expenses	18,788	2.520
General expenses	5,167	.693
General repairs and maintenance	9,525	1.307
Power expenses	10,949	1.556
	44,429	6.075
Balance to net revenue account	38,747	5.088
Add bank interest, etc.	1,397	
Total	40,144	

Out of which the following charges have been met—

Income tax	1,020
Interest on capital	11,485
Sinking Fund	9,595
Rent of leased lines	6,518
Payment to Heywood	3,036
	31,654

Leaving a balance of £8,490, of which £5,000 is being carried to reserve fund and £3,490 handed over in aid of rates. The total length of line now worked by the Corporation is 28 miles, and the cars in stock amount to 69. Other particulars are appended :—Total car miles, 1,788,030; total number of passengers carried, 14,584,777; number of units per car mile, 1.546; average cost per unit, 1.006d.; percentage of working expenses to receipts, 53.4; average revenue per mile of single track, £2,079.

(Continued from page 2.)

BUSINESS FOR SALE.

GOOD OPENING FOR ENERGETIC MAN.—The business of the late Mr. George Conaty, 109, Colmore Row, Birmingham, is for Sale. It has been established six years, and has at present a fair amount of work in hand of a mechanical nature. Apply, Mrs. Conaty, Mayfield House, King's Heath, Birmingham.

DICK, KERR & CO.,
Limited,
ABCHURCH YARD, CANNON STREET, LONDON, E.C.
ENGINEERS & CONTRACTORS.

Complete Equipment
TRAMWAYS & LIGHT RAILWAYS
at home and abroad.

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 60 of the principal undertakings of the United Kingdom for the week ended June 27, give total receipts of £225,126, or £13,982 more than in the corresponding week last year. The total length of track was 2,863 miles, or 24 more than for the corresponding week. Receipts were at the rate of £89 2s. 2d. per track mile, an increase of £4 3s. 5d. as compared with the corresponding week of last year, largely attributable to the exceptionally fine weather.

THE BRITISH ELECTRICAL FEDERATION.

The traffic statement for the week ended June 20, 1914, shows that the receipts from tramways and railways amounted to £43,208 as compared with £43,100 in the corresponding week last year, and from omnibuses £17,590, as compared with £8,962, making a total of £60,888, as compared with £52,062. The tramway and railway route mileage was 429.82 as compared with 428.47. Upon such of the services as were working both last year and this year the receipts show an increase of £2,388 upon the week.

RAILWAYS OF THE UNITED KINGDOM.

The summary of the official traffic returns of the fifty principal railways of the United Kingdom for the week ended June 28, gives a total of £2,479,893, which was carried on 22,161 miles, being at the rate of £111 18s. per mile of line open. For the corresponding week of 1913 the receipts of the same lines amounted to £2,460,289, with 22,100 miles open, or £111 6s. 6d. per mile. There was thus an increase of £19,574 in receipts, an increase of 61 in mileage, and an increase of 11s. 6d. in receipts per mile. Thirty-six of the returns distinguish between the receipts from passenger and goods traffic, and these show an increase of £24,036 (or 19s. 8d. per mile) in the passenger receipts and a decrease of £3,624 (or 6s. 6d. per mile) in the receipts from goods traffic. The aggregate receipts of the fifty railways since the beginning of the year amounted to £57,593,894, in comparison with £57,965,007 last year, a decrease of £371,113.

COPPER AND ALUMINIUM MARKET.

July 3, 1914.

Messrs. Henry R. Merton and Co., Ltd., 2, Metal Exchange Buildings, Leadenhall Avenue, E.C., supply the following quotations of prices per ton :—

	Friday, July 3. £ s. d.	Last week. £ s. d.	A Year Ago. £ s. d.
Standard Copper (cash)	61 13 9	60 0 0 ..	63 10 0
,, ,, (three months)	62 0 0 ..	60 12 6 ..	65 17 6
Electrolytic Copper—bars or ingots ..	63 10 0 ..	62 15 0 ..	68 5 0
Aluminium—bars or ingots	83 0 0 ..	83 0 0 ..	89 0 0

COAL MARKET.

July 3, 1914.

Messrs. Locket and Judkins, of 3, Fenchurch Avenue, E.C., report as follows :—

	Friday, July 3. s. d.	Last week. s. d.	A Year Ago. s. d.	Two Years Ago. s. d.
London, free into barge in Thames—				
Best Admiralty Welsh (large)	26 0 ..	26 6 ..	25 0	No Quotations owing to transport workers' strike.
Best Seconds..	24 0 ..	24 6 ..	23 6	
Ordinary Drys	21 0 ..	21 6 ..	20 6	
Best Washed Nuts	20 6 ..	20 6 ..	20 6	
Best Washed Peas	19 6 ..	19 6 ..	19 0	
Cardiff, f.o.b.—				
Best Admiralty (large) ..	21 6 ..	22 0 ..	20 6 ..	17 6
Best Seconds	19 6 ..	20 0 ..	19 0 ..	16 9
Ordinary Drys	16 6 ..	17 0 ..	16 0 ..	15 0
Best Washed Nuts	16 0 ..	16 0 ..	16 0 ..	14 0
Best Washed Peas	15 0 ..	15 0 ..	14 6 ..	12 6
Newcastle, f.o.b.—				
Best Steams	14 9 ..	14 6 ..	15 0 ..	13 3
Best Seconds	12 6 ..	12 6 ..	13 6 ..	11 6
Smalls	8 6 ..	8 9 ..	8 9 ..	8 0

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Anglo-Argentine	June 24	£54,782	£51,387	25	£1,405,980	+ £7,851
Auckland..... (28 days)	June 5	20,007	20,919	49	247,311	+ 6,331
Ballarat and Bendigo	April 26	4 417	4,567	4	4,567	+ 150
Brazilian St. Rly. Mlrs	May	44,820	50,237	43	623,872	+ 76,626
Brazilian Traction.....	June 20	93,641	95,867	25	2,365,396	+ 93,391
Brisbane.....	May	25,560	29,860	21	110 385	+ 14,495
British Columbia .....$	May	701,991	673,314	47	8,128,904	+ 317 158
Buenos Aires Pt. & City	May	6,925	6,713	22	36,5 7	+ 3,206
Buenos Aires Lacroze...	May	45,274	44.890	48	490,426	+ 5,927
Calcutta.....Rs.	June 27	61,386	64,444	25	17,35,370	+ 96 972
Cape Town	April	12,175	13,408	17	55,388	+ 3,326
Carthagena & Herreria	June	2.158	1,405	26	13,796	— 3,585
Cordoba.....	May	13,622	14,6-0	8	28,094	+ 1,448
East India	May	1,867	1,885	43	19,124	+ 735
Kalgoorlie.....	May	3,059	3,025	22	12,830	— 1,542
La Plata.....	May	5,130	4,727	21	24,683	— 2,042
Lima.....	May	8..256	33,150	22	173,754	+ 6,825
Lisbon ..... Mlrs.	March	...	160,532	...	...	...
Madras (14 days) Rs.	June 20	26 556	27,685	25	345,669	+ 26,504
Manaos	May	12,877	10,199	4	10,129	— 2,678
Melbourne	May	62.000	64,500	22	3.7 000	+ 3,000
Mexico .....$	May	595,795	592,275	22	2,939,082	+ 261,322
Montevideo.....	June	28,820	28,049	35	257,246	— 1,167
Para	May	25,924	22,465	26	129,509	— 26,036
Port Elizabeth.....	Ap il	4.357	3,758	17	16,633	+ 245
Puebla . ... $	May	61,400	65 500	22	328,800	+ 35,100
Rangoon	May	5,206	5,223	21	27,337	+ 792
Shanghai .....$	June 24	22,327	25,000	25	613,460	+ 95,522
Singapore .....$	June 27	11,666	11,221	25	310,105	+ 7,609
Toronto .....$	May	811,872	871,738	21	4,163,988	+ 323,708
Winnipeg.....$	May	326,827	337,664	21	1,756,539	+ 105,203

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TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	1914.	Incr. or Dec.	Aggregates. Wks.	1913-4.	Increase or Dec.
Aberdeen Corporation..	June 24	£1,591	£1,780	+ £189	3	£6,151	+ £396
Accrington Corp.....	,, 24	589	687	+ 98	12	7,444	+ 475
Ayr Corporation	,, 27	395	409	+ 14	5	2,464	+ 268
Bath Electric	,, 24	1,197	1,321	+ 124	25	22,724	+ 1,717
Birkenhead Corp.	,, 28	1,280	1,320	+ 40	12½	16,464	+ 169
Birmingham Corp.	,, 27	11,420	12,708	+ 1,288	13	161,360	+ 13,789
Blackburn Corporation	,, 24	1,290	1,381	+ 91	13	18,122	+ 1,453
Blackpool Corporation	,, 25	1,690	1,748	+ 98	13	19,633	+ 2,475
Bolton Corporation....	,, 28	2,810	2,918	+ 108	13	37,150	+ 2,098
Bournemouth Corp.....	July 1	2 1 0	2,225	+ 115	13	28,168	+ 1,900
Bradford Corporation..	June 27	5 971	6,149	+ 178	13	81,642	+ 5,048
Brighton Corporation .	,, 28	1,375	1,435	+ 60	12½	14,299	+ 1,160
Bristol	,, 26	8,690	9,547	+ 857	25½	209,480	+ 20,258
British Elec. Federatn	,, 26	52,062	60,888	*	...	...	...
Burnley Corporation ..	,, 27	1,623	1,629	+ 6	13	22,256	+ 785
Burton-on Trent Corp	,, 28	277	304	+ 27	13	3,870	+ 205
Bury Corporation.....	,, 28	1,359	1,438	+ 79	12½	18,178	+ 552
Cardiff Corporation....	,, 20	2,913	2,936	+ 23	11	33,694	+ 2,357
Chatham and District..	,, 25	953	1,068	+ 115	26	22,429	+ 359
Chesterfield Corp.	,, 25	251	252	+ 1	12	3,519	+ 390
Colne Corporation	,, 27	279	287	+ 8	...	...	...
Cork Electric.....	,, 25	535	534	— 1	25	12 236	+ 249
Croydon Corporation ..	,, 19	1,772	1,792	+ 20	11	20,899	+ 1,522
Darlington Corporation	,, 27	256	270	+ 14	13	3 403	+ 190
Derby Corporation	,, 27	936	1,036	+ 50	12½	13,200	+ 700
Dover Corporation	,, 27	249	252	+ 3	13	3,059	+ 86
Dublin & Lucan	,, 30	267	312	+ 45	26	3,583	+ 24
Dublin United	,, 25	6,436	6,657	+ 221	25	143,819	— 3,454
Dundee City	July 1	1,369	1,375	+ 6	6½	9,099	+ 189
East Ham Corporation	June 27	1,020	1,138	+ 118	12½	18 620	+ 617
Exeter Corporation	,, 26	359	371	+ 12	13	4,608	+ 384
Gearless Mo'or 'Buses.	,, 27	...	512	...	2d	12.139	...
Glasgow Corporation ..	,, 27	20,860	22,352	+ 1,492	4	86.217	+ 6,610
Glossop(U.Elec.Supply	,, 27	130	124	— 6	26	3 207	— 86
Halifax Corporation ..	,, 23	2,215	2,261	+ 46	12	27,462	+ 1,693
Hastings & District.....	,, 24	1 033	1,080	+ 47	25	22,035	+ 303
Huddersfield Corp.	,, 27	2,143	2,358	+ 215	13	30,685	+ 3,164
Hull Corporation	,, 27	3,114	4,223	+ 1,109	13	40,870	+ 1,577
Ilford U.D.C.	,, 27	483	617	+ 134	12	6,737	+ 902
Ilkeston Corporation ..	July 1	137	163	+ 26	13	1,788	+ 23
Ipswich Corporation ..	June 27	492	532	+ 40	13	6,121	+ 542
Isle of Thanet	,, 27	956	1,014	+ 58	39	17,054	+ 841
Kilmarnock Corp.	,, 27	173	171	— 2	6	1,091	— 52
Lanarkshire	,, 25	1.749	1,975	+ 226	25	47,737	+ 6,301
Lancashire United	,, 24	1,580	1,703	+ 123	25	41,037	+ 4,657
Leeds City	,, 27	8,403	8,466	+ 63	13	109,564	+ 4,659
Leicester Corporation..	,, 27	3,003	3,028	+ 25	26	74,344	+ 3,789
Leith Corporation	,, 27	752	783	+ 31	6	4,762	+ 184
Leyton U.D.C.	,, 25	1,530	1,541	+ 11	12	17,333	+ 830
Liverpool Corporation..	,, 27	13,172	13,409	+ 237	25½	331,334	+ 15,679
Llandudno &Colwyn B	,, 26	417	424	+ 7	3½	6,917	+ 56
London County Council	,, 24	42,997	44,726	+ 1,729	12	538,730	+ 24,887
London Gnl. Omnibus..	,, 27	72,466	75,924	+ 3,458	26	1,610,028	+ 84,262
London United	,, 26	7,306	7,096	— 210	26	156.179	+ 2,542
Lowestoft Corporation	,, 27	219	217	— 2	38	7,167	+ 779
Maidstone Corporation	,, 25	211	216	+ 5	13	2,726	+ 188
Manchester Corp.....	,, 27	17.597	18,238	+ 641	13	229,816	+ 6,649
Met. Elec. Trys.	,, 26	9.778	10,128	+ 350	26	232,491	+ 4,989
Nat. Steam Car Co.,Ld.	,, 30	4,796	7,537	+ 2 741	34	145,478	+ 60.494
Nelson Corporation.....	,, 6	210	231	+ 21	9½	2,163	+ 127
N'castle-on-Tyne Corp.	,, 27	8,076	8,668	+ 593	13	69,392	+ 6,618
Newport (Mon.) Corp....	,, 27	769	837	+ 68	13	10,719	+ 1,240
New St. Helens & Dist...	,, 24	838	873	+ 35	52	42,791	+ 3,348
Northampton Corp	,, 26	591	595	+ 4	13½	7,531	+ 273
Nottingham Corp.	,, 25	3,332	4,167	+ 835	12½	43,777	+ 2,098
Oldham Corporation ...	,, 28	2,165	2,408	+ 243	14	32,165	+ 2,330
Portsmouth City.....	,, 27	2,537	2,733	+ 196	13	30 917	...
Preston Corporation ...	,, 17	887	877	+ 10	12	10,807	+ 337
Provincial	,, 27	2,119	2,370	+ 251	38	70,500	+ 4,243
Reading Corporation ...	,, 25	713	749	+ 36	12	9,016	+ 695
Rhondda...	,, 25	1,218	1,215	— 3	25	31,046	+ 1,708
Rochdale Corporation ..	,, 27	1,574	1,586	+ 12	13	21,124	+ 775
Rotherham Corp.	July 1	974	1,058	+ 84	13	13,363	+ 699
Salford Corporation ...	June 29	5,290	5,443	+ 153	12½	68,438	+ 1,224
Sheffield Corporation...	,, 28	7,394	7,684	+ 290	13½	104,635	+ 4,374
Southampton Corp.	,, 24	1,337	1,473	+ 136	12	16,717	+ 1,035
Southend-on-Sea Corp	,, 24	932	1,181	+ 189	13	12,426	+ 2,254
South Met. Trys.	,, 26	937	1,195	+ 258	26	27,984	+ 7,356
South Shields Corp.....	,, 27	919	1,038	+ 119	12½	19,100	+ 1,237
Sunderland Corp.	,, 28	1,621	1,702	+ 81	13	19,096	+ 1,012
Sunderland District ...	,, 24	552	590	+ 38	34	19.790	+ 1,716
Swindon Corporation ...	,, 24	168	180	+ 12	12	2,186	+ 206
Torquay	,, 25	616	645	+ 29	25	13,014	+ 456
Trys. (M.E.T.) 'Buses	,, 27	5.433	10,354	+ 4,925	26	229.450	...
TynesideTrys.&Tmrds	,, 24	1,722	1,823	+ 101	25	14,638	+ 918
Wallasey Corporation	,, 27	1,238	1,323	+ 85	12½	16 645	+ 1,282
Walsall Corporation ..	,, 27	602	614	+ 14	26	16.101	+ 342
Walthamstow U.D.C....	,, 27	748	886	+ 138	13	10,857	+ 1,919
Warrington Corp	,, 4	457	471	+ 14	9	4,119	— 39
West Ham Corporation	,, 25	2,851	3 018	+ 168	12	35,839	+ 1,730
Wigan Corporation ...	,, 25	1,449	1 437	— 12	12	18,939	+ 634
Wolverhampton Corp	July 1	1,096	1 109	+ 23	14	14,729	+ 540
Yorkshire (W. Riding)	June 28	1.460	1.443	— 17	26	37.743	+ 1,129

* From such of the services as were working both last year and this year the receipts show an increase of £2,388 upon the week.

ELECTRIC RAILWAY TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	1914.	Incr. or Dec.	Aggregates. Wks.	1914.	Increase or Dec.
Central London.....	June 27	£5,282	£5,085	— £197	26	£130,433	— £2,790
City and South London	,, 27	2.605	2.587	— 18	26	70,352	— 4.248
Liverpool Overhead.....	,, 28	1,826	1,801	— 25	26	44.460	+ 1,509
London Electric.....	,, 27	13.685	13,410	— 275	26	369.290	+ 2,500
Mersey	,, 27	2,072	2.098	+ 26	26	58.518	+ 389
Metropolitan	,, 28	17.746	19,579	+ 1,833	26	473,875	+ 41,268
Metropolitan District..	,, 27	13.902	13,412	— 490	26	342.336	+ 584

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AMBERLEY HOUSE, NORFOLK ST., W.C.

TRAMWAY AND OMNIBUS SHARE LIST.

Paid.		On Week	Quotations, July 3.
...	Alabama Trac. Ltg. Power Co. 5% 1st Mt. Gd. Bds.	— 8	66 — 69
5	Anglo-Argentine Trams. Co., Lim., 5½% Cum. 1st Pref.	...	4⅛ — 5⅛ xd
5	Do. 5½% Cum. 2nd Pref.	...	4⅛ — 4⅜ ,,
100	Do. 4% Deb. Stk. Red.....	...	91 — 93 ,,
100	Do. 4½% Deb. Stk. Red.....	— ⅛	96 — 99 ,,
100	Do. 5% Deb. Stk. Red.....	...	94½ — 96½ ,,
100	Auckland Elec. Trams Co. Ld. 5% 1st Mt. Db. Stk. Red	...	101 —104 xd
1	Bath Electric Tramways, Lim. Pref. Ord	...	⅜ — ⅝
1	Do. 5% Cum. Pref	...	⅛ — ¼
100	Do. 4½% 1st. Mort. Deb. Stock, Red.....	...	70 — 75
100	Birmingham Dis. Pwr. & Trac. Co. Ld. 4½% 1st Db. Stk.	...	82½ — 84½ xd
10	Blackpool and Fleetwood Tramroad Co.	...	14 — 15
	Bombay Elec. Supply and Trams. Co., Ord.	...	13¼ — 14¼ xd
10	Do. do. 6% Cum. Pref.....	...	11 — 11¾
100	Do. do. 4½% Db. Stk Rd.	...	94 — 96 xd
$100	Brazilian Traction Light and Power Co. Lim.....	— ⅛	78 — 80
5	Brisbane Elec. Trams. Investment Co., Ltd., Ord.	...	6⅞ — 7⅛
5	Do. do. 5% Cum. Pref	...	4¼ — 5¼
100	Do. do. 4½% 1st Deb Stock, Red. ...	...	98 —100 xd
10	Bristol Tramways and Carriage Co.	...	6¾ — 7
10	Do. do. 4% Cum. Pref.	...	6⅞ — 7⅛
100	Do. do. 4% Deb. Stock	...	100 —103
100	Do. do. 4½% Deb. Stock	...	95 — 97
100	British Columbia Elec. Rly. Co., Lim., Def. Ord. Stck.	...	107 —111
100	Do. Pref. Ord. Stock	...	103 —107
100	Do. 5% Cum. Perpetual Pref. Stock.....	+ 1	105 —108
100	Do. 4½% 1st Mort. Debs.	...	98 —101
40	Do. 4½% Vancouver Power Debs.	...	94 — 98
100	Do. 4½% Perpetual Cons. Deb Stk.	+ ½	95½ — 97½
100	British Elec. Traction Co., Lim., 6% Cum. Pref.....	...	85 — 89 xd
100	Do. 7% Non-Cum. Pref.	...	53 — 56 ,,
10	Do. 6% Pref. Ord. Non- Cum.	+ ½	14 — 16
100	Do. Deferred Ord. Stock	...	6 — 8
100	Do. 5% Perpetual Debenture Stock.....	— ½	92 — 94
100	Do. 4½% Second Debenture Stock, Red	— 1	76 — 79
100	B. Aires Port & City Trms. 6% 1st Deb. Stk. Red.	...	73 — 78
100	Buenos Ayres Lacroze Trams. Co., Stg. 5% 1st Mrt. Deb.	...	100 —102
5	Calcutta Tramways Co., Limited, Ord.	...	6½ — 7
5	Do do. 5% Cum. Pref.	...	4¼ — 5 xd
100	Do. do. 4½% 1st Deb. Stock, Red.	+ 1	97 —100 ,,
1	Cape Electric Tramways, Ld., ...	...	⅝ — ¾
10	Carthagena and Herrerias Steam Tramways Co., Lim.	...	2¾ — 3⅛
100	Do. 5% Debs., Red.	— 2	86 — 89
5	City of Buenos Ayres Trams. Co (1904), Lim.	— ⅛	5¼ — 5⅛
100	Do. 4% Debenture Stock Red, 1985	...	95 —100 xd
100	Colombo Elec. Trys. and Ltg. Co. 5% 1st Mort. Deb. ...	...	91 — 95
100	Companhia Ferro Carril do Jardim Botanico, 5% 1st Mt.	— 2	91 — 94 xd
10	Cork Electric Tramways and Lighting Co. 5% Cum. Pref.	...	— 7
10	Dublin United Trams. Co. (1896) Lim. Ord.	— ⅛	— 10¾
10	Do. do. 6% Pref.	— ⅛	— 12¼
100	Do. do. "A" Red.	— ½	— 80½
100	Do. do. Deb. Stock "B" Red. ...	...	— 80
10	Gateshead & Dist. Trys. Co., Ord.	...	8¼ — 9
10/-	Hastings & Dist. Electric Trams. Co., Ld., Ord.	...	⅞ — 1
1	Do. do. 6% Cum. Pref.	...	⅞ — 1
100	Do. do 4½% Deb. Stk. Red.	...	65 — 70
$1,000	Havana Electric Railway, Con. Mort. 5% Bonds	...	93½ — 97½
100	Hong Kong, Tramways Co., 5% Mort. Bds. (Regd.).....	...	83½ — 87½
10	Imperial Tramways, Ord.	...	3 — 3½
10	Do. do. 6% Cum. Pref.....	...	6¼ — 6¾
100	Do. do. 4½% Deb. Stock	...	74 — 76
5	Isle of Thanet Elec. Trams. & Ltg. Co., 5% Cum. Pref....	...	2 — 2¼
100	Do. 4% Debenture Stock	...	71 — 76 xd
1	Kalgoorlie Elec. Trams., Ltd.	...	...
100	Do. do. 5% "A" Deb. Stk.	...	82 — 87
100	Do. do. 6% "B" do.	...	10 — 20
7/6	La Plata Elec. Trys. Co., Lim., 6% Cum. Pref.....	...	⅞ — 1
10	Lanarkshire Tramways Co.	...	9⅛ — 10⅜
100	Lancashire United Tramways, 5% Prior Lien Deb.	...	84½ — 86½ xd
1	Lisbon Electric Trams., Lim., Ord.....	...	1⅛ — 1⅜
1	Do. 6% Cum. Pref.	...	1⅛ — 1⅜ xd
100	Do. 5% Mort. Debs.	— 2½	92½ — 97½ ,,
1	London and Suburban Trac. Co., Lim., Ord.	...	⅞ — ⅞
100	London General Omnibus Company, Limited, 4½% Deb.	...	99 —101 xd
100	Do. Do. 5% Cum. Inc. Deb. Stk. Red.	...	88 — 91
100	London United Trms.(1901) Ltd., 4% 1st Mt. Deb. Stk. Red	...	54 — 58 xd
100	Madras Electric Trams. (1904) Lim., 6% Cum. Pref.....	...	4⅞ — 5¼
5	Do. do. 5% Deb. Stk., Red.	...	99 —101 xd
100	Manaos Trys. & Ltg. Co., 5% 1st Debs., Red.	— 2 ½	75½ — 78½ ,,
$100	Manila Electric R. R. and Lighting Corp. Capital Stk.	— ⅛	101 —105 xd
$1,000	Do. do. 5% Bds.	...	98½ —100⅛
1	Mansfield and Dist. Trys. Ltd. 6% Cum. Pref.	...	1⅜ — 1⅝
100	Metropolitan Elec. Trms. Ltd., 4½% Deb Stock, Red. ..	...	85 — 88 xd
100	Do. 5% Deb. Stock, Red. ..	...	85⅝ — 88½
100	Mexico Tramways Co., Common Stock	— 2	73 — 75
500	Do. Gen. Con. 1st Mort. Gld. Bonds ...	...	80 — 84
100	Do. 6% 50-yr. Mort. Bonds	— 3	74 — 78
...	Michigan United Railways 5% 1st Mort. Gld. Bonds ...	...	90 — 92
100	Montreal Street Railway, Sterling 4½% Debs. (1922)	...	99 —101
100	Do. 4½% Sterling Debs, (1923) ..	...	98 —100
1	National Steam Car Co. Ltd	— ⅛	⅝ — ⅞
10	Oldham—Ashton and Hyde Elec. Ord.	...	6 — 6¼
10	Do. do. 5% Cum. Pref.	...	5⅜ — 6⅛
5	Para Elec. Rlys. and Ltg. Co., Ord.	...	4 — 4½
5	Do. do. 6% Cum. Pref.	...	4 — 4½
1	Perth (W.A.) Elec Trams., Ld., Ord.....	...	...
1	Potteries Electric Traction Co., Ltd., Ord.	...	⅜ — ⅝
1	Do. 5% Cum. Pref.	...	⅞ — 1⅛
100	Do. 4½% Debenture Stock, Red.	...	81½ — 84½
1	Provincial Tramways, Lim., Ord.	...	⅝ — ⅞ xd
10	Do. 5% 1st Deb. Stock	...	98 —103
...	Puebla Tramway, Light & Power Co., Prior Lien 5%..	— 2	69 — 74 xd
5	Rangoon Elec. Trams. & Supply Co., 6% Cum. Pref.....	— ⅛	5 — 5⅜ ,,
100	Do. do. 4½% 1st Mt. Db. Stk.	...	94 — 96 ,,
100	Rhondda Tramways Co., 5% 1st. Mt. Debs.	...	87 — 89
$500	Rio de Janeiro Trys. Lgt & Pr. Co. 1st Mt. 30 yr, 5% Gd. Bds.	— 2½	97½ — 99½ xd
100	Do. do. 5% 50-yr. Mort. Gold Bonds	...	90 — 92
$500	Sao Paulo Tr. Light & Power, Co. 5% 1st Mort. Debs. 1929	...	97 —101
100	Do. do. 5% Perp. Cons. Debs....	...	98 —101
10	Shanghai Elec. Construction Co.	— ⅛	12½ — 13⅝
100	Singapore Elec. Tramways Lim., 5% Debs. Red	...	88 — 93
	South Met. Elec. Trams. and Ltg. Co., 6% Cum. Pref. ...	...	...
100	Do. do. 4% Deb. Stk.....	...	64 — 68 xd
...	Southern Elec. Trys. Co. of B.A., 5% 1st Mrt. Debs.	...	95 — 97
100	Toronto Railway Co., 1st Mt. 4½% Sterling Bonds	...	97 — 99
100	Toronto Suburban Rly. Co., 4½% 1st Mort. Deb. Stock	...	78 — 80 xd
100	Tramways (M.E.T.) Omnibus Co., 4½% Gtd. Deb. Stk.	...	90 — 92
5	United Elec. Tramways of Monte Video, Ord.....	— ⅛	4½ — 4¾ xd
5	Do. do. 6% Cum. Pref.	...	4½ — 5⅛ ,,
100	Do. do. 5% 1st Deb. Stk. Red.	+ ½	94½ — 96½
100	Winnipeg Elec. Rly. Co. 4½% Perp. Cons. Deb.	...	93½ — 95½
5	Yorkshire (West Riding) Elec. Trys. Co., Ord.	...	⅜ — ½
5	Do. do 6% Cum. Pref.....	...	4 — 4½ xd
100	Do. do. 4½% 1st Deb. Stock. Red.....	+ ½	83 — 86 ,,

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THE Tramway & Railway World
WITH MOTOR TRAFFIC SECTION

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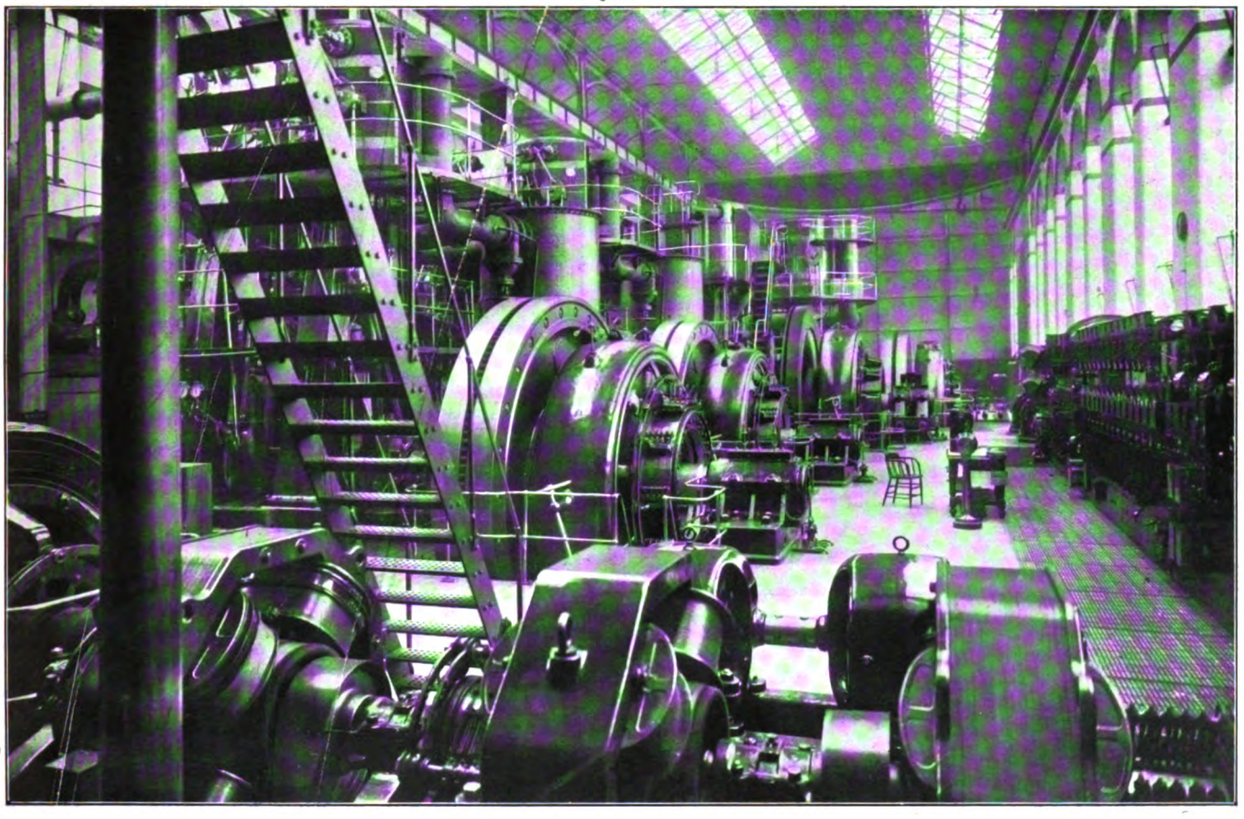
THE MUNICIPAL TRAMWAY SYSTEM OF NEWCASTLE-ON-TYNE.

In view of the annual congress of the Tramways and Light Railways Association at Newcastle next week, we present a brief description of the tramway system of the city, together with a number of interesting illustrations, for which we are indebted to the courtesy of the general manager, Mr. Ernest Hatton, who has been the chief officer and engineer of the undertaking since 1905. In the interim the system has been greatly extended and its finances have been placed upon a thoroughly sound basis.



General View of Interior of Power-Station—Newcastle Corporation Tramways.

The population of Newcastle-upon-Tyne now numbers 300,000, while the rateable value is £1,663,436, and the area of the municipal borough measures 8,452 acres. The area served by the tramway is somewhat hilly, the maximum gradient being 1 in 11. The industrial undertakings in the town itself, and both up and down the River Tyne, are numerous and most important, giving employment to multitudes of men, so that the tramway services constitute an essential feature in the life of the community. Work on the present tramway undertaking was commenced in December, 1899; two years later one-half of the system was opened to traffic, and there are now in operation close on 63 miles of single track. In addition to these the Corporation have running powers over 6⅛ miles of the Tyneside Tramway Company's lines, while the company have similar powers over 8¾ miles of the city tramways. An Act was obtained in the Parliamentary session of 1911 for extensions of the tramway system within the city and Newburn, which when completed will be 3 miles 5 furlongs in length from the end of the existing Scotswood Road tramway terminus In the same bill provision was made to run motor omnibuses, and there is one route 3½ miles in length at present being served by Tilling-Stevens petrol electric omnibuses. A further bill has been promoted during the present session for tramway extensions and omnibus service.

The tramway track is of the familiar type. The rails are laid on a bed of concrete 7 in. thick, the

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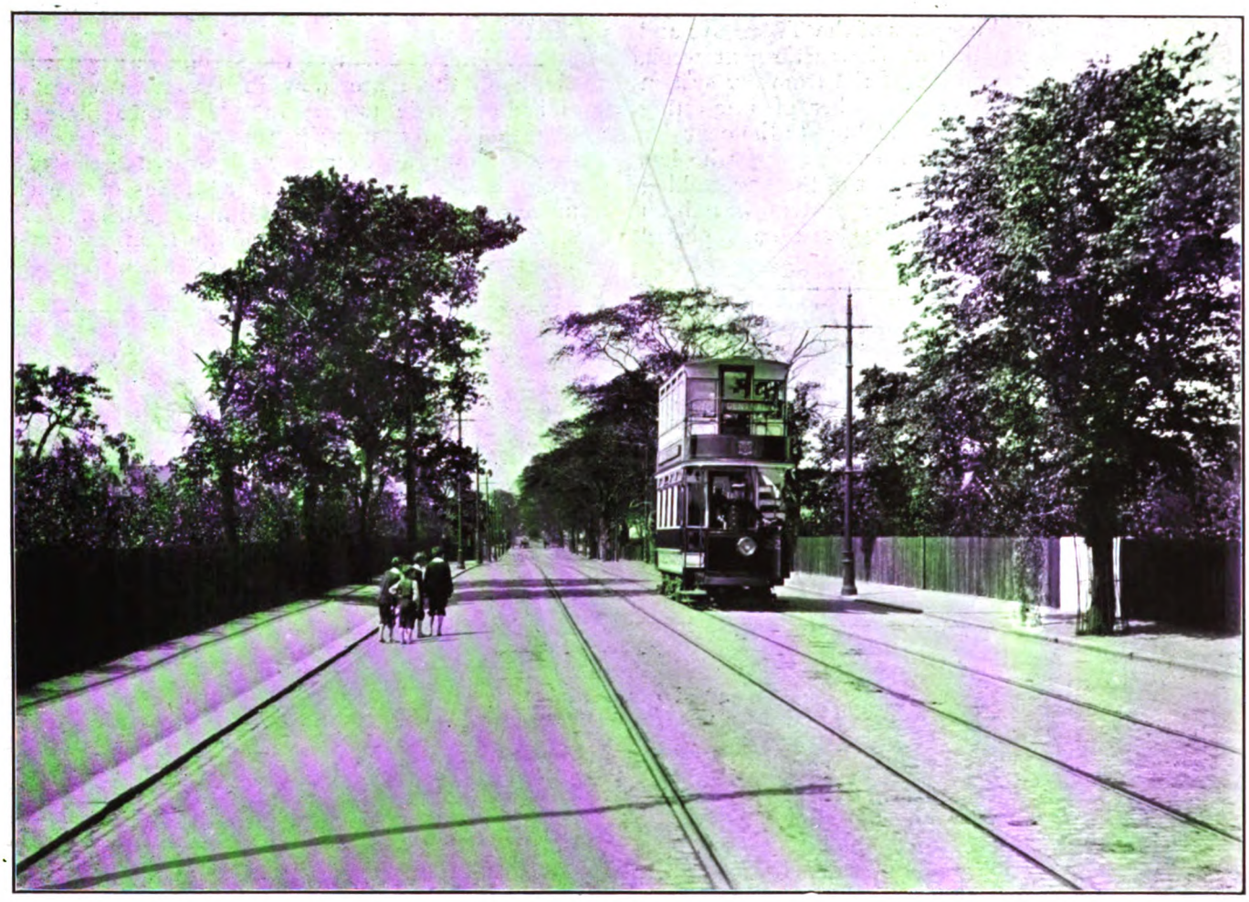
paving being of hard wood blocks in the city, and granite setts in the outlying parts. The rails are principally in 60-ft. lengths, and weigh 101 lb. per yard, the joints being generally of the fish-plate type, and bonded with two 4/0 crown bonds. Three and a half miles, however, are welded by the Thermit process, one bond being used with this type of joint. Recently 1,250 yds. of track have been relaid, and the fish-plated joints have been welded by the Tudor Accumulator process, one bond also being used on each joint.

Overhead Work.

The overhead work is constructed with 4/0 S.W.G. copper trolley wire of the grooved pattern with mechanical ears, and is carried partly on centre and partly on side poles. Some 12 months ago it was decided gradually to change from double insulation to triple insulation, and this work is being rapidly completed. A commencement has also been made with replacing the centre poles with side poles, and, as opportunity offers, the remainder of the centre poles will be replaced in the same manner. Considerable trouble was originally experienced by the breaking down of the pole cables leading from the feeder pillars to the trolley line, chiefly in frost accompanied by wet weather. Pole cables more often break down from mechanical fatigue of the rubber than from purely electrical faults. The following method has been adopted to get over this trouble. Galvanised-iron pipes are fixed outside the poles, made perfectly watertight, and clamped in position with collars. These pipes are insulated inside by means of red fibre tubing. In the case of centre poles, switch bases are fixed at the bottom of the poles, and these pipes are screwed into the top of the base. The pole cables have therefore a straight run from the switches, through the top of the base, and where they emerge from the fibre lined iron tubes they are fixed in porcelain insulators and are led thence to the trolley wire; at no point are they in contact with any metallic surface, as the pole cable has a secondary insulation throughout its length quite apart from the rubber covering. In the case of side poles a standard feeder pillar is erected close to the pole and the galvanised-iron pipes are screwed in the top and thence led by a gentle bend to the top of the pole. The conductors on this cable are made of a great number of small stranded wires, which gives greater flexibility; these are served overall with double compounded braiding, and since this alteration has been made no further trouble with the pole cables has been experienced. Three motor tower wagons are now being used, and horses have been entirely discarded in connection with the overhead system excepting for pole planting or other heavy work.



Top-Covered Car and Typical Overhead Construction—Fenham Terminus, Newcastle Tramways.

Power-Station.

The power-station and general offices are at the Manors, on the site of what was originally Pandon Valley or Dene, as the valleys running down to the Tyne are called. The foundations were consequently difficult and expensive to construct, the whole station being on a bed of concrete about 18 ft. thick, reinforced with steel rails. The situation is very central with regard to the tramway system, and is conveniently arranged for fuel to be delivered from the adjoining coal siding to the bunkers.

Supply of Energy.

The original system of supply was continuous current at 550 volts, the total capacity of direct-current plant being 5,100 kw., comprising the following units:

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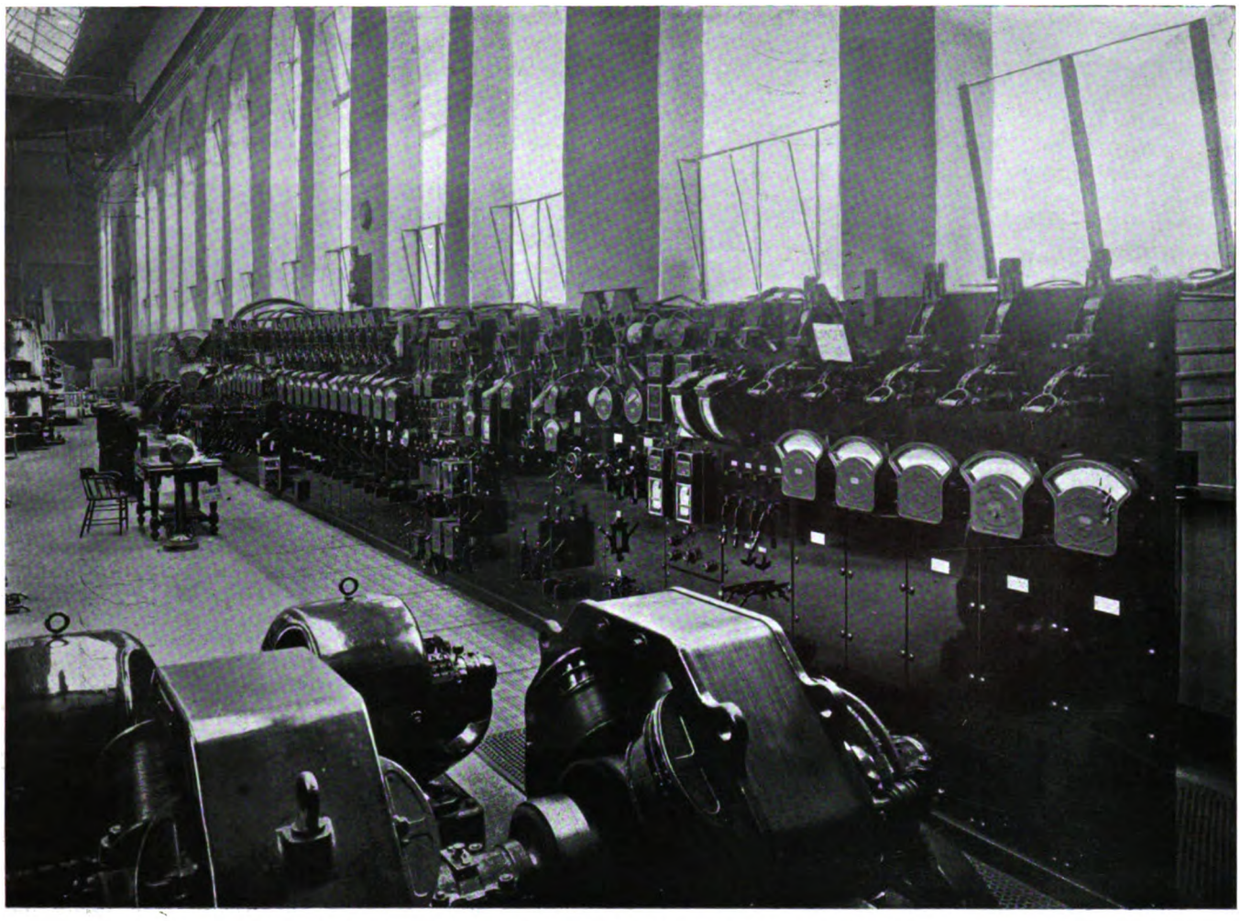
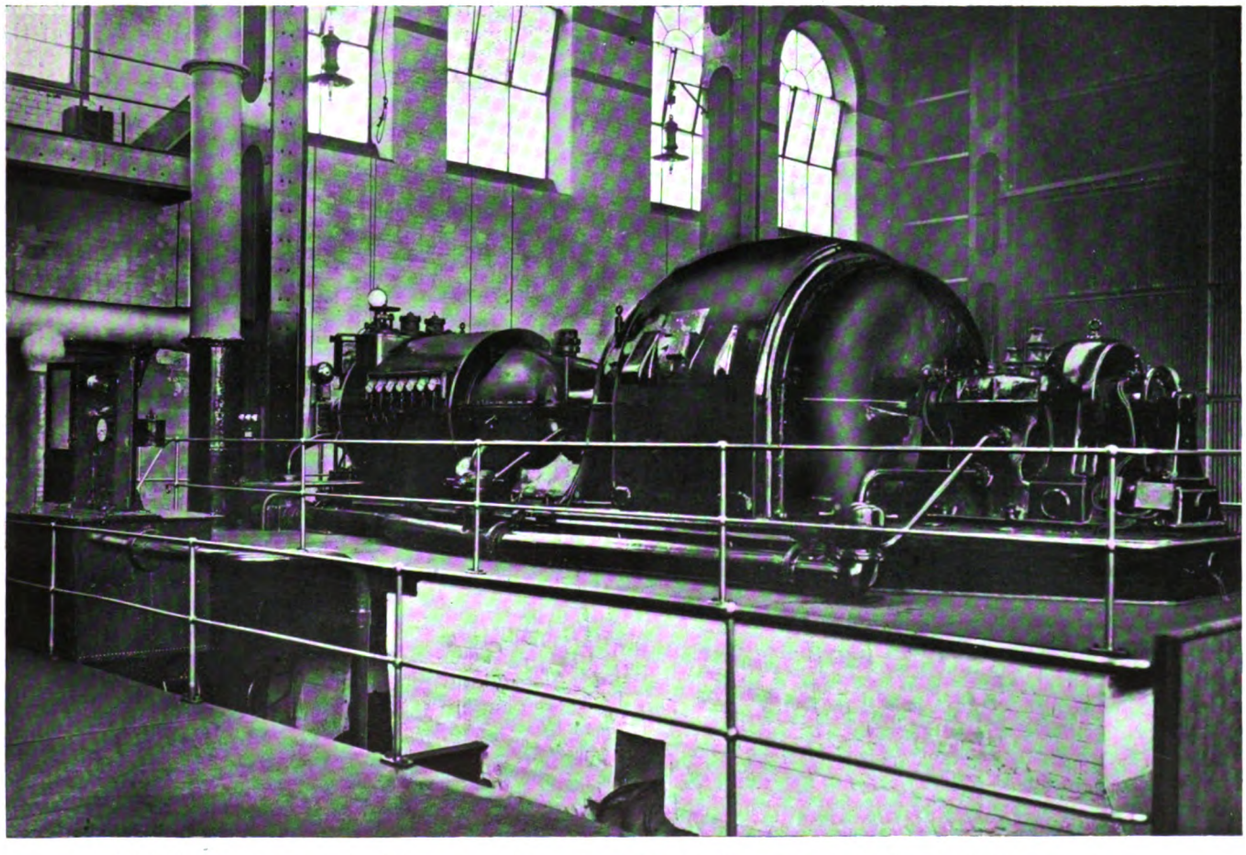


Traction Switchboard in Manors Power-Station—Newcastle Tramways.



3,000-kw. Parsons Turbo-Alternator Three-Phase 6,600 Volts, 40 Periods—Newcastle Tramways.

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One Willans-Bruce Peebles generating set of 840 I.H.P.; two Coates-Westinghouse generating sets of 1,200 I.H.P.; one Wallsend Slipway-Westinghouse generating set of 2,200 I.H.P.; and one Coates-Westinghouse generating set of 3,500 I.H.P.

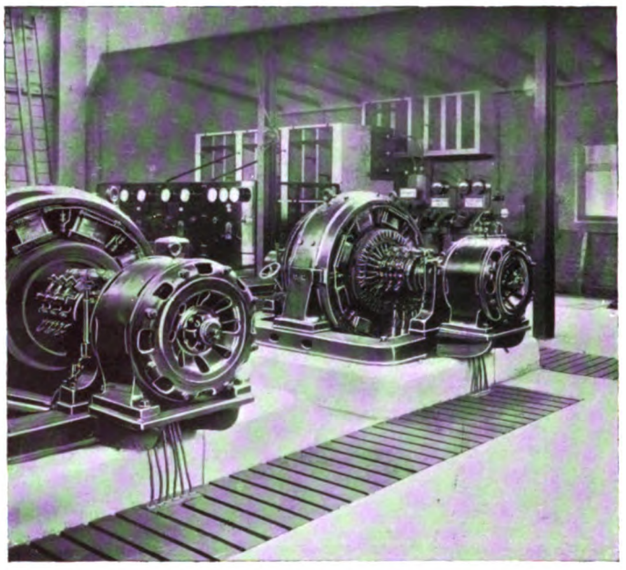
All the engines, with the exception of the Willans, are of the vertical Corliss type, the two largest being triple-expansion. During the last few years the loads have steadily increased to such an extent that the distribution losses on some of the longest and heavily loaded routes began to be serious, and, as the extension of the plant in the power-station became necessary, a decision had to be come to as to the system of generation to adopt for these extensions, for it was obvious that by installing further direct-current plant the question of efficient distribution would still have to be solved. After complete tests on the system had been carried out; three alternatives were considered: (1) Continuous-current generation with boosters.

Head Office and Power-Station, Manors.

(2) Continuous-current generation with battery sub-stations. (3) Three-phase generation at 6,600 volts with rotary converter sub-stations. In arriving at a decision as to the most satisfactory scheme to adopt, consideration was given to the disadvantage of turbines coupled to direct-current generators, with the attendant risk of commutator trouble at high-speeds; and finally scheme 3 was decided upon.

The plant installed consists of one Parsons 3,000-KW. turbo-alternator, running at 2,400 revolutions per minute, generating at 6,600 volts and 40 complete cycles per second. The Willans engine in the power-station was disposed of, and on its foundations two 800-KW. rotary converters, of the British Westinghouse self-synchronising type, were installed. These rotary converters are also arranged to run inverted.

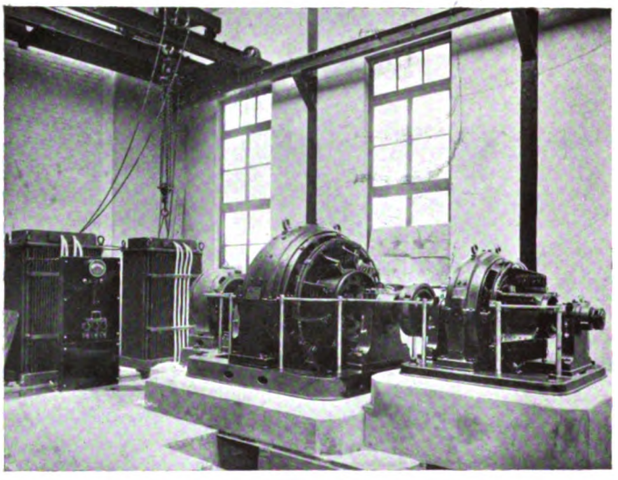
There are also installed at the power-station two large storage batteries, each of 700 ampere hours capacity, at a one-hour rate of discharge, and capable of giving 1,200 KW. for short periods when working in parallel. These batteries work in conjunction with reversible boosters supplied by The Lancashire Dynamo and Motor Manufacturing Company, so arranged as to run automatically on traction either separately or in parallel, and are hand regulated on



Rotary Converters at Westgate Road Sub-Station.

lighting. Their chief duty, however, is used for working in parallel with the main generators and rotary converters over the peak loads, and it may here be mentioned that the rotary converters in the Manors power-station are daily running in parallel with the slow-speed, steam-driven, direct-current generators with perfectly satisfactory results.

A sub-station with two 350-KW. British Westinghouse rotary converters was erected at the west end of the



Byker Sub-Station.

city, being in such a position that it could deal with three important tramway routes.

This sub-station is arranged so that the rotary converters can run on a three-wire 480-240 volt system for lighting purposes in the areas of Benwell and Fenham. This provision was made in view of the fact that the Council took over the Provisional Electric Lighting Order from the then Urban District Council when the city boundary was extended into those areas some few years ago. At present the private supply is in the

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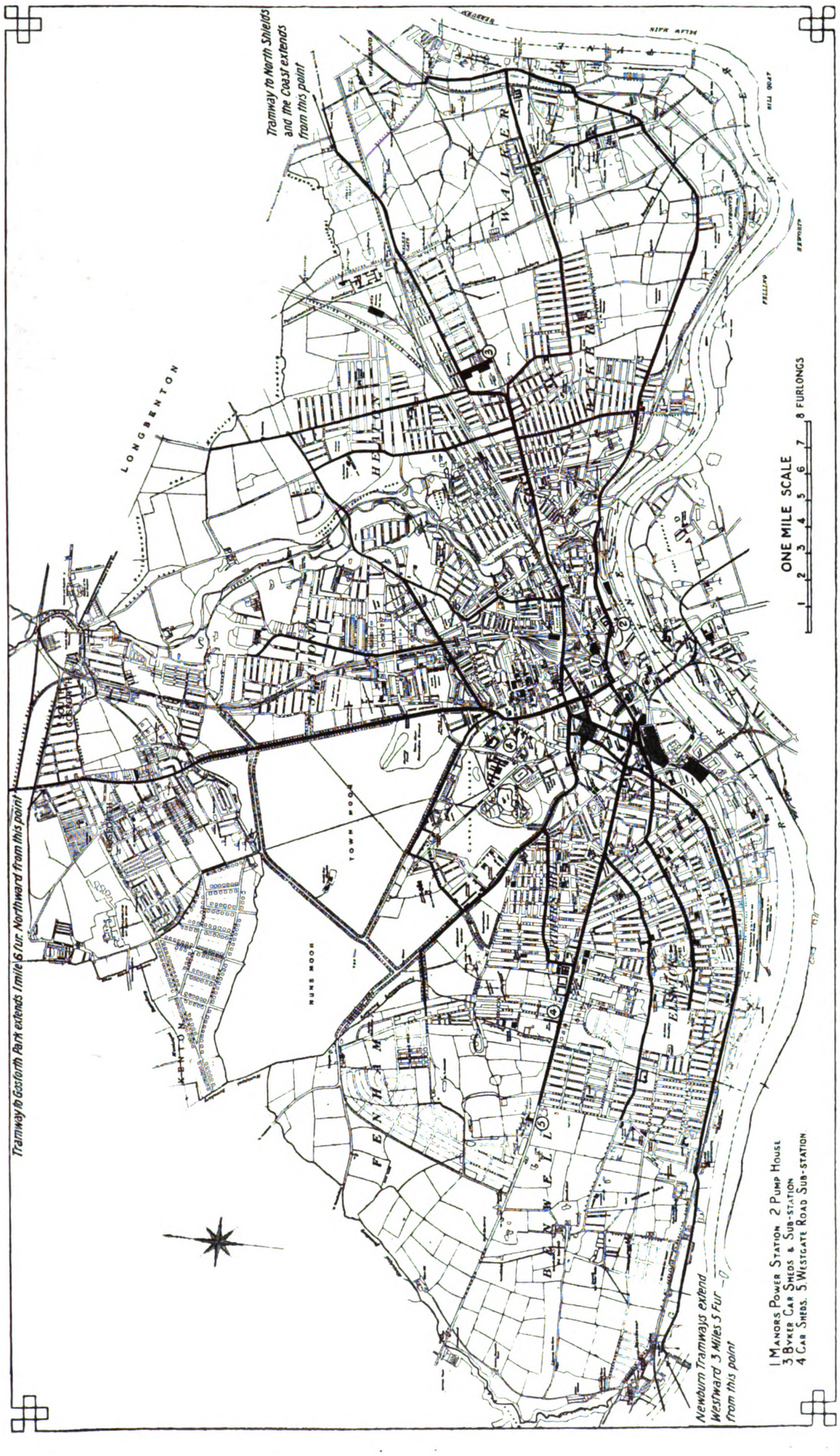

Map of Newcastle Corporation Tramways.

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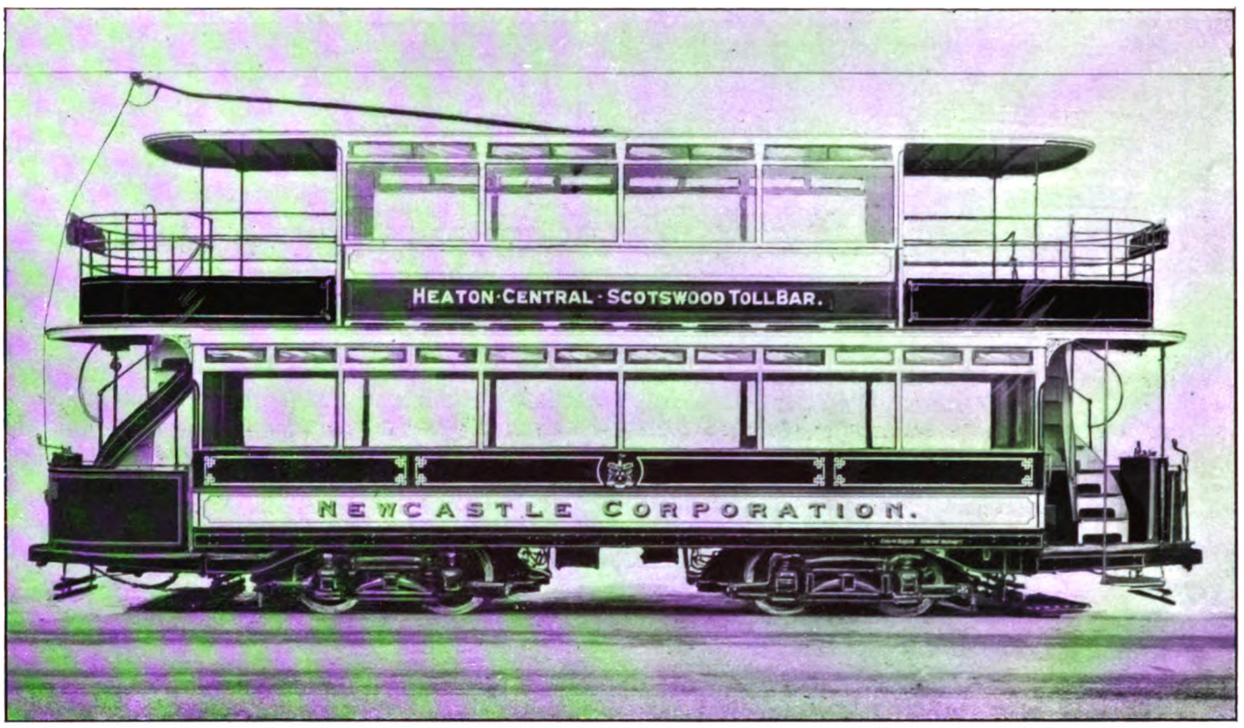

Top-Covered Bogie Car.

Single-Deck Bogie Car.

CARS OF THE NEWCASTLE CORPORATION TRAMWAYS.

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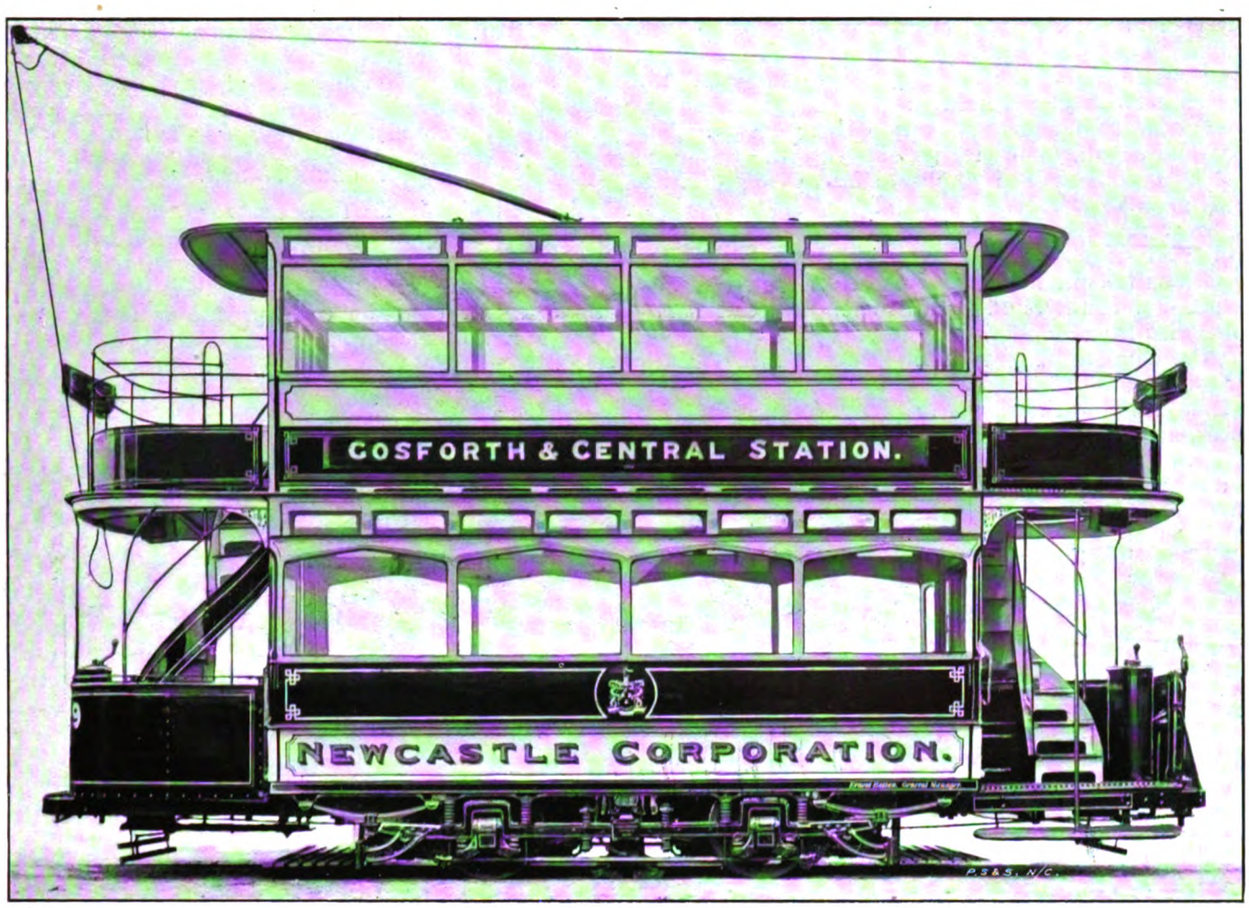

Top-Covered Single-Truck Car.

Vestibule Cars under Construction at Byker Car Works.

Vestibule Car Built at Corporation Car Works.

LATEST DESIGN OF CAR.

CARS OF THE NEWCASTLE CORPORATION TRAMWAYS.

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hands of one of the local electric lighting companies, under a temporary agreement with the City Council, until such date as the latter decide to carry out the generation and distribution themselves. Between the power-station and this sub-station there existed spare earthenware ducts originaliy laid with the tramway, and this fact enabled duplicate extra high-tension feeders, of Messrs. Henley's manufacture, to be provided between the power-station and this sub-station at a minimum of cost. The extra high-tension switch apparatus is built in cubicles of the British Westinghouse manufacture, and the oil switches are electrically controlled from a desk panel on the engine room floor. In the sub-station the switches are mechanically operated.

In addition to the supply of power for traction purposes, a three-wire lighting supply is given from motor-driven balancers to some of the most important public buildings in the centre of the city, and also a considerable amount of street lighting is supplied direct from the traction bars. Originally 200 open-type arc lamps were erected, and these were followed by an additional 215 lamps, the installing of which was carried out by the staff of the tramways department. Many of these have since been changed to flame arc lamps in the more important thoroughfares. The total number of arc lamps installed in the city is 415, representing approximately 10 miles of street electrically lighted, and a mile of the quay side is also lighted by means of these flame arc lamps. The whole of the switching on and off of the street arc lamps is done by direct control from the power-station switchboard.

The new plant has been running without interruption since January of this year, and at present a duplicate turbo-alternator is in course of construction and another sub-station is nearly completed in Byker depot, which is designed to take two 800-KW. rotary converters to deal with the tramway loads in the east end of the city, as these have every prospect of increasing owing to the large shipyard that Sir W. G. Armstrong, Whitworth, and Company, Limited, have erected at Walker, where a great number of workmen will be employed. In some of the extra high-tension switch gear extensions, Messrs. Reyrolle's well-known iron-clad gear has been adopted.

Petrol-Electric Omnibus (Tilling-Stevens Type)—Newcastle Corporation.

Boiler House.

In the boiler house there are 12 Lancashire boilers each 30 ft. 6 in. long by 8 ft. 6 in. diameter, fitted with Vickers stokers and automatic coal weighing machines. The coal is delivered from the North Eastern Railway Company's system on to a private siding, and the trucks are drawn directly over the bunkers by an electric locomotive. The boilers are fitted with Musgrave's superheaters, and at the stop valve the temperature varies from 100 to 120 deg. Fahr., or a total steam temperature of about 500 deg. Two economisers are also fitted in the flues, one having 360 tubes and the other 480 tubes, the temperature of the feed water from the economiser varying from 260 to 270 deg. Two of the boiler feed pumps are of the Weir type, each capable of delivering 6,000 gallons of water per hour, in addition to which two injectors are installed as a standby.

Pumping Station.

The pumping station for the supply of condensing water is situated on the quay side 140 feet from the quay wall, and about a quarter mile from the power-station. The condensers are 80 ft. above H.W.L. The floor level is about 7 ft. above mean tide. Three sets of pumps were originally installed in this station, two of 1,250 gallons capacity per minute, and one of 2,500 gallons capacity per minute. The smaller sets became unable to deal with the quantity of water required, and were replaced by two new sets of 2,500 gallons capacity per minute. The original sets were made with cast-iron bodies and gun metal working parts, but it was found the chemical action of the River Tyne water set up a considerable amount of corrosion

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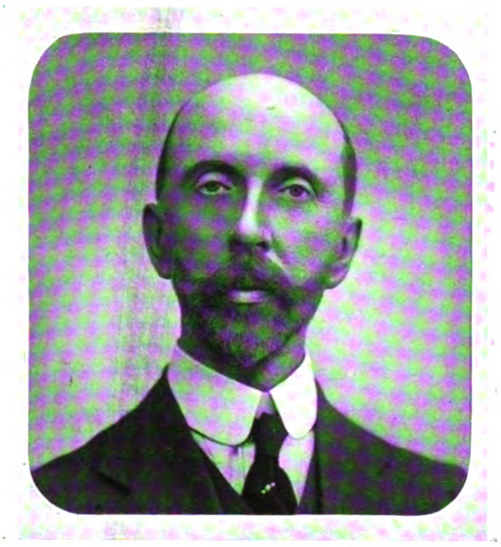
in the cast-iron bodies, consequently the new pumps were made entirely of gun metal, with manganese bronze wearing parts. Each pump consists of a two-stage turbine pump direct coupled to a four-pole 133 B.H.P. motor, the other end of the pump being direct coupled to a reaction turbine. Two lines of pipe run from the pump house to the power-station, one being the delivery to the condensers and the other the return to the river; but instead of passing directly into the river the circulating water, after passing through the condensers, is delivered through the return pipe back to the pumping station, and thence through the reaction turbine. The amount of power required to pump 2,500 gallons of water, with this reaction turbine receiving the benefit of the return water, is reduced to about 75 to 80 E.H.P., thus reducing the amount of power that would be required without the turbine by 42 per cent. The combined efficiency of each pump and motor with the turbine disconnected is 67 per cent. Originally two 15-in. suction pipes were laid from the pumping station to the river, but one of these has just been replaced with a 24-in. suction. The supply of water has been quite satisfactory.



Councillor R. Mayne
(Vice-Chairman, Newcastle Tramways Committee).

Alderman J. H. Rodgers
(Chairman, Newcastle Tramways Committee).

Depots.

Originally there were four car depots, two of these, with stables, having been taken over from the old horse tramway company, and subsequently converted to depots. They are situated, one in the centre of the city, one in the east and west ends respectively, and one in the north in the Urban District of Gosforth. The last-named depot was closed in the year 1908, the cars being transferred to other depots. The east end, or Byker depot, is equipped with the necessary machinery and tools for the repairing and equipment of the cars and the building of car bodies. Here have been constructed 22 bodies for double-deck, open-type cars; 45 bodies with top covers; and top covers have been added to 22 other cars.

Rolling Stock.

The rolling stock now comprises 67 four-wheeled, double-deck cars with covered tops, and 57 with open tops. There are also 59 single-deck, double-truck bogie cars; 19 double-deck, double-truck bogie cars with open tops, and three with covered tops; making a total of 205 passenger cars. The special feature of all the cars built by the Corporation is the garden type of seat, which is fitted on both decks, and this has been adopted as the standard seat.

Mr. Ernest Hatton
(Engineer and General Manager).

The business of the Newcastle tramways is conducted by a committee of 26 members, of which Mr. J. H. Rodgers, who was elected an alderman last November after 18 years' service as a councillor, has been chairman for several years. Mr. Rodgers takes a deep interest in the fortunes of the undertaking, and during his chairmanship some notable departures have been made, while the finances have been carefully watched. Alderman Rodgers is ably seconded by Councillor R. Mayne, as vice-chairman. When the general manager and engineer, Mr. Ernest Hatton, came to Newcastle from Salford the prospects of the former undertaking were by no means encouraging. Since he assumed the management there has, however, been a steady and sustained improvement and the tramways have now become a thoroughly satisfactory feature of Newcastle's municipal activity. The undertaking has expanded in all departments and now occupies a position of assured prosperity; in part due to the determination, as the chairman remarked recently, not to concede a general halfpenny fare until at least a considerable portion of the capital expenditure has been repaid.

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LONDON TRAMWAY IMPROVEMENTS.

Trailer Cars.

A large order for trailer cars has just been placed by the London County Council. During the past year a few of these cars have been in use on the route between the Victoria Embankment and Tooting at certain hours of the morning and evening, but the present trailer car is a converted horse car, and it affords far less accommodation than the bogie truck motor car which is drawing it. Hundreds of passengers have, however, thus been enabled during the rush hours to travel between their homes and their places of business with less delay than if they were obliged to wait for an ordinary car. The readiness of passengers to take advantage of the trailer facilities is shown by the manner in which they resort to the open top deck even in wet weather, while in the hot months the open-air seats may be said to be at a premium.

The Embankment-Tooting route probably carries the heaviest traffic on the London County Council's system, and at the point known as the Elephant and Castle it is intersected by seven thoroughfares. All of these are used by tramcars and by motor omnibuses, as well as by other vehicles, the density of the traffic during the busy period making the junction the most congested in the Metropolis. It is only necessary to watch a motor car and trailer crossing this spot at such a period to understand that the innovation is a valuable means of preventing congestion.

This aspect of trail-car operation, together with that of economical working, will be greatly emphasised when the department comes to put in operation the 150 trailers which are to be specially constructed now that the Board of Trade have sanctioned their use on practically all the routes south of the Thames. Before long it is also hoped that trailers will run through from Tooting to the chief traffic centres of the London United tramways. The company have this session obtained the necessary powers from Parliament in spite of a renewal of Metropolitan Police opposition. A number of provincial tramway authorities have also been granted similar powers.

On July 7 the Highways Committee presented a report recommending the acceptance of the tender of the Brush Electrical Engineering Company, Limited, for the manufacture, supply, erection, delivery, and maintenance of 150 trailer cars, and the equipment of 200 electric cars with couplers and traction gear for drawing trailers, the total amount of the tender being £74,200. The other tenders were from Hurst, Nelson, and Company, Limited, the United Electric Car Company, Limited, and the Norddeutsche Waggonfabrick Aktien-Gesellschaft, Germany, the amounts of their respective tenders being £80,750, £83,750, and £93,500. The Brush Electrical Engineering Company are to be allowed to sub-let certain portions of the work to such persons or firms as may be approved by the chief officer of the tramways department.

A Second Tramway Shelter on the Embankment.

Another notable improvement which the L.C.C. tramway management have provided for the public is the sheltered island for queues comprised in the structure at the Blackfriars end of the Victoria Embankment. This provides space for eight standing cars, and it has greatly facilitated the loading during the rush hours. The structure was brought into use at Easter, 1911, for dealing with the traffic to the populous districts south of the Thames, and the effect of its working is seen in the earlier hour at which the regulating staff are now able to leave duty, viz., about 8-15 p.m. Their task comprises a turn of over three hours announcing the destinations of the cars, gently exhorting the passengers to "hurry up, please," and preventing from boarding the cars at the shelter such persons as have not taken places in the queues.

With the present accommodation there is only one possible respect in which the work might be improved, and the person to accomplish that desideratum at the outset would be an ex-military man of good address accustomed to control bodies of men. He would be able to

Motor Car and Trailer Leaving the Embankment Shelter and Entering Blackfriars Bridge.

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turn about the persons forming the queue on the western side of the shelter, and thus load a car before it arrived at the platform. The importance of this step will be gathered when mention is made that in addition to the four or five cars which are loaded simultaneously, there are often half a dozen more waiting to come up, a cross-over having been put in about two years ago to facilitate the marshalling of the cars.

Evidence that the tramways department are awake to the importance of securing an improvement on their upon the accommodation. Occasionally all four queues on each side may be seen projecting 50 yards or more in the open. It is worth mentioning that very few persons among the many thousands who use the shelter daily ever avail themselves of the subways constructed a few years ago by the City Corporation to enable pedestrians to cross in safety from Queen Victoria Street and New Bridge Street. For an hour or two in the evening there is a stream of motor cars and cabs coming from the city at a very fast speed. This traffic

Tramway Shelter on the Victoria Embankment, Blackfriars, London.

Queues of Passengers Waiting for Cars Outside Blackfriars Shelter.

present creditable achievements is shown by the recent announcement that plans have been prepared for the erection of a second shelter a short distance to the west. It will be 105 ft. in length, as compared with the length of 190 ft. comprised in the existing building, illustrated by the first of the accompanying views.

The second illustration affords a mild proof of the inadequacy of the shelter during the busy hours. The picture was taken from the west end on a Saturday afternoon, but it does not depict the maximum demand is never held up, although two constables are on duty in the roadway. What enables the tramway passengers to cross in safety is the system of refuges in roadway.

About eight months ago a traffic census at the shelter showed that 109 tramway cars left Blackfriars in an hour, conveying 7,600 passengers, equal to nearly 126 passengers per minute. It is estimated that the number of cars per hour has increased to 128. The figures, of course, comprise cars going in both directions.

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Contributions by Omnibus Owners to Road Maintenance.

During the past few weeks appreciable advances have been made towards bringing to a head the important question of the owners of motor omnibuses and other heavy motor road vehicles contributing to the cost of road maintenance. On June 24 Mr. Herbert Samuel, President of the Local Government Board, informed a deputation from County Councils and other rural authorities that the Government will appoint a technical committee to investigate matters regarding the weight of traction engines, and a Joint Committee of the two Houses of Parliament to go into the subject of contributions to the cost of road maintenance by the owners of trackless trolley cars and motor omnibuses. The subject is indeed ripe for comprehensive and systematic treatment. Private Bill Committees have in a number of cases imposed liability, but guiding principles are needed by them, and, moreover, omnibus companies escape altogether, seeing that they do not need to come to Parliament for powers. One of the most important decisions yet given by a Parliamentary Committee on the subject was that delivered on July 1 by the Local Legislation Committee of the House of Commons on the Sheffield Corporation Bill. The promoters sought authority to run motor omnibuses on seven additional routes, parts at least of which would be in Yorkshire and Derbyshire. The two County Councils concerned naturally wanted a contribution towards the cost of maintaining the roads to be used by the omnibuses. The Sheffield Corporation took up the extraordinary attitude—extraordinary that is for a local authority—of refusing to entertain such an idea, and insisted that they had a right to run their omnibuses on the county roads without any regard to the County Councils. After all the evidence and argument had been heard, the Committee took a week to consider their decision. They then sanctioned four of the routes, and ordered that Sheffield shall pay a road maintenance charge of three-eighths of a penny per omnibus-mile run. This is in accordance with decisions in other cases. The figure, however, is to be revised every three years by arbitration if necessary, and then Sheffield will pay half the extra cost of road maintenance. Should further imperial grants be made for main roads, Sheffield's contribution is to be correspondingly diminished. If this decision is confirmed, the practice so established will probably stand until the Government take action on the report which may be expected from the Joint Committee. Apparently till then companies will continue to go free. But, at all events, matters should soon be in train for arriving at general principles capable of application both to companies and to local authorities.

Important Tube Railway Scheme Dropped.

The abandonment, for this year at any rate, of the important scheme promoted by the Great Northern and Metropolitan Railway Companies for the development of underground railway communication in London must be viewed with regret. The comprehensive proposals went further than those of the Metropolitan Railway Company which failed to find acceptance last year. This year's Bill was promoted by the two companies named with the objects of making a connecting line between the Great Northern and the Great Northern and City Railways at Finsbury Park, a junction line between the Great Northern and City at Moorgate Street and the Metropolitan at Liverpool Street, and an extension of the Great Northern and City to the East End of Queen Victoria Street where there would be an

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exchange station with the Waterloo and City Railway. As the tunnels of the Great Northern and City Railway, unlike those of the other tube lines, are of sufficient diameter to take ordinary suburban rolling stock, it was intended to run trains right through from the Great Northern system on to that of the Metropolitan in the heart of the city. Moreover, by means of the East London Railway, goods and mineral trains hauled by electric locomotives could be taken on to the South Eastern and the Brighton Companies' systems at New Cross. The Bill to authorise these proposals was before a Committee of the House of Commons for several days in June, but difficulties arose on collateral issues in connection with the North London Railway Company. On June 23 the Committee passed the Bill subject to conditions, among which were that running powers should be given to the North London Company over parts of the Great Northern Railway, now used by agreement, and that the Great Northern and City Railway and the new lines proposed should be used for passenger and parcel traffic only. Rather than submit to the conditions, the promoters withdrew the Bill. It is to be hoped, not merely in the interests of the railway companies concerned, but in those of the general public, that the parties will come to an agreement and that a Bill with similar objects will be passed next year. The advantage to the public would be very great, and the step would be in consonance with the general policy of connecting London underground railways with the trunk lines outside. Then the Great Northern and City Railway would probably be put on its feet financially, especially if goods as well as passenger trains were allowed to be run. There seems to be no good reason why it should not be allowed to take advantage of its exceptionally large tube tunnels, which were built of such a size in order to take the Great Northern suburban rolling stock. Why the project of making a junction line to enable this to be done was not carried out years ago is a matter which can probably best be explained by the Great Northern Company. That corporation, however, is now anxious that the junction should be made. Another reason why it should be carried out is that in a time of national emergency the new link between the northern and southern systems would be useful for transport puposes.

Without a Traffic Authority.

If London could boast of a civic patriotism equal to that possessed by some obscure urban district council, her citizens would not rest until they had secured a remedy for the humiliating confession made by the Home Secretary on June 11. During a discussion on the Home Office section of the Civil Service estimates, Mr. McKenna took special pains to rebut criticism levelled at the police and the Home Office by the member for Bedford in regard to accidents, etc. The Home Secretary was profuse in asserting that neither the police nor the Home Office can claim to be a traffic authority, but he appears to have been silent upon the apparent determination of the Government to ignore the recommendation made by the Select Committee in August last for the establishment of a Traffic Board for the metropolis. Whilst repudiating Mr. Kellaway's effort to saddle the police with the reponsibility for not preventing the increase in accidents, the Home Secretary stated that they had to discharge certain duties relating to the regulation of traffic, but only from the point of view of safety. This is a valuable admission that should not be lost sight of by the tramway authorities, who, in the public interest, have complained of the refusal of the police to permit them, until the arrival of an expert from Scotland Yard, to remove vehicles other than tramcars that have been in collision on the track. Mr. Kellaway's apparent desire to blame the police for the increased number of accidents during the past four years is as incapable of proof as was the attempt made before the Select Committee by the Commissioner of Police to ascribe the excessive total of fatal mishaps to the large number of tramcars in the streets. It is impossible also to accept wholly the Home Secretary's contention that Scotland Yard have shown no preference towards omnibuses as compared with tramcars. Possibly Mr. McKenna would have cause to change his opinion if he called for a return of the number of prosecutions against omnibus drivers for driving to the danger of people who were about to enter or were leaving tramcars, such return to show by whom the proceedings were taken. Without any motor omnibuses to endanger tramcar passengers, and with the support of the Scottish

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Automobile Club, the Glasgow magistrates have found it necessary to enact a by-law to prevent overtaking traffic passing stationary tramcars on the near side. A similar law prevails in many American cities and in some cases a movable bar is brought into operation at stopping places. Londoners have a right to look for protection both under the ordinary law and under the Motor Car Act.

Possibilities of Tramway Improvement.

The opinion is often expressed that there is little scope for improvement in present tramway installations. If this were true there would be some special features in that method of transportation differentiating it from all other engineering works. The impossibility of eliminating or even of diminishing noisiness and other faults of so many tramcars now heard and seen is difficult of belief, or that the rough track on which they roll cannot be smoothed out more permanently than by the present make-shift devices. The great object of car-body designers naturally enough is to provide as many seats as possible and may be, in some instances, to give a great amount of standing room for strap-hangers at rush hours. Other matters should also be taken into consideration, such as the easy movement of passengers at all times and the sufficiency of elbow or shoulder room allowed. Any restrictions in these directions not only add to the discomfort of passengers, but to the difficulty experienced in getting into their seats and of vacating them when the occupier wishes to get out. A crushed and crowded conductor has but little chance of collecting all the fares due, and his attempts to effect this are exceedingly unpleasant both to himself and to the other inmates in what is too often a kind of "Black Hole." Longitudinal seats with divisions make travelling more comfortable for average-sized people, but are cruel on those of larger dimensions and unnecessarily capacious for the small and lean; these same seats without divisions allow of more give-and-take—but this advantage is neutralised if a careless conductor does not insist on people "moving up." Cross seats on top are like the traditional goose for a meal: too big for one and not big enough for two. This leads to a sensible restriction of the gangway width, to the great inconvenience again of both conductors and passengers. Unless tramcar bodies can be lengthened, the number of seats should be less, and especially on the top deck, where there is really only room for three athwartship. This restriction of space arises from the same cause as the comparatively small carrying capacity of railway coaches in Great Britain, namely, the narrowness of the so-called "six-foot," or space between the tracks, which only allows of a very moderate overhang and consequent width of vehicles on double tracks. As to the other point, it is beginning to be realised that an unevenly elastic track is good for neither permanent way nor rolling stock, and that a road rigid or equally resilient throughout is the most economical in the end. Experiments are now being made with reinforced concrete substructures to the rails, either in the form of longitudinal beams under the metals or, where the rails are imbedded in the aggregate, forming one solid continuous mass, which might eventually be incorporated in the substance of the road itself. Were such a system carried out provision would, of course, have to be made for renewing the rails. And when the road carpet over this *béton armé* consists of india-rubber—as it is sure to be within a measurable period of time—then will comparative peace again fall on the dwellers in crowded and much frequented streets and some of the most nerve-racking noises will be stilled.

THE MUNICIPAL TRAMWAYS ASSOCIATION.

ANNUAL CONFERENCE, 1914.

The Annual Conference of the Municipal Tramways Association will be held at Salford on September 22, 23, and 25, 1914.

The following papers will be read and discussed at the meetings:

"Some Notes on Transit Facilities for Passenger Transportation in Large Cities," by Mr. J. M. McElroy, Manchester.

"Trailer and Coupled Cars," by Mr. A. L. C. Fell, London.

"The Utilisation of Tramways for Goods Traffic," by Mr. W. Clough, Bury, and Mr. G. W. Holford, Salford.

The head-quarters of the Association will be at the Midland Hotel, Manchester. An attractive programme is being prepared and will be issued in due course.

BIRMINGHAM TRUCKS.

With regard to the Birmingham truck illustrated and described in our issue of June 11 we are asked to state that the first truck of this type was designed and constructed by the Burnley Corporation tramways department, and is the standard truck of that system, and in a short time the whole of the cars will be equipped with this type of truck. Certain modifications in the design have been made on account of the narrow gauge in Birmingham to enable the patent double-drive and the electro-mechanical brake to be employed.

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LONDON AND SOUTH WESTERN ELECTRIC TRAINS.

The first of the new electric trains of the London and South Western Railway has arrived at Wimbledon from the Eastleigh Works, and is being tested on the District Railway. The train, which is shown in the accompanying illustration, is painted dark green with gold lettering, and consists of three cars—two motor cars, one at each end, and a trail car in the centre, seating in all 190 passengers. The outer ends of the two motor cars are semi-circular, and the whole effect is neat and pleasing. The train has been equipped by the British Westinghouse Electric Manufacturing Company. The coaches are of the compartment type, with side door to each compartment. A special motor truck, equipped with two motors, is fixed under each train-end unit, the remaining trucks being of the company's standard pattern. Each train will thus have four motors of 275 H.P. each. The control apparatus is of the relay automatic, multiple-unit type, providing for uniform acceleration. All the motors on a train of any length will thus be controlled from the front driving cab. Current is collected from the rail by means of cast-steel collector shoes hung from the truck, the return side of the circuit being formed by the running rails. The electric working will be commenced first on the Kingston round-about line; it is hoped that this line will be in operation this year, and thus open up a district which has fallen behind for want of this relief. The "round-about" route has hitherto had the reputation of having the slowest service in the kingdom, owing entirely to want of competition. The necessary stimulus has now been applied by the motor omnibuses.

The work on the power-station at Earlsfield, the electrical equipment for which is being provided by Messrs. Dick, Kerr and Company, is well advanced, as is also the erection of cables, which have been supplied by Messrs. Siemens Brothers and Company. These cables are erected on brackets supported by stakes driven in the ground. As previously mentioned in these pages, the electric work is in charge of Mr. Herbert Jones, the company's electrical engineer, the other engineering works being under Mr. A. W. Szlumper, chief resident engineer.

The rolling stock is being constructed under the direction of Mr. S. Warner, carriage and wagon superintendent, and the entire scheme is being carried out under the supervision of the general manager of the London and South Western Railway, Mr. H. A. Walker.

Electric Suburban Train of the London and South Western Railway

THE CREEPING OF RAILWAY RAILS.

(Contributed.)

It has always been recognised that some movement of rails is inevitable on account of the expansion of the metals, owing to variation of temperatures. Ordinarily, provision is made for this by leaving a certain clear distance between the rail ends; and when the expansion takes place the rail is allowed to close up, clearance being provided in the holes of the fish plate at the rail ends. Later, other and perhaps more important causes of rail movement will be mentioned. Before proceeding, however, it may be of interest to enter a little into detail as to the effect of the expansion of steel rails.

The coefficient of lineal expansion of steel is ·0000065 for one degree Fahrenheit. Taking as a unit one mile of road, and the extreme range of temperature as the difference between 120 deg. in the summer and 20 deg. in the winter, we find the length of rails in summer to be 41 in. longer than in winter, as follows:

$$\cdot0000065 \times 5280 \times 12 \times 100 = 41 \text{ in.}$$

In the case of 45-ft. rails ·251 in. per joint. Moreover, the lengthening and contracting of the rails is a continuous and alternating process, and very rapid as soon as warm weather begins.

Parts of a railway track are obviously more exposed to the sun than others, causing the expansion to be greater at places; such for instance as in sheltered cuttings running east and west, which are exposed to the full power of the sun's rays. There is evidence that in one such case the rails expanded as much as 2 ft. in the course of five or six hours over a comparatively short piece of track.

It is, therefore, obviously essential to make proper provision for this expansion. It is usual to provide in 45-ft. rails $\frac{3}{8}$ in. maximum clearance at each joint, or 44 in. per mile. Unless this clearance is constantly maintained the expansion of the rails will result in a wholesale back or forward travel of the rails, the force of the expanding steel being practically irresistible, and sufficient if retarded to buckle the road sideways, as is often experienced in India and other like climates. This results also in taking the sleepers out of line and "bunching" them, affecting the efficiency of suspended joints and the gauge of the track. The efficiency of the rail fastenings is also affected, as these are brought out of square.

The full effect of the movement of rails is generally shown on curves. Switches and crossings are also affected by the kinking of track at these points; actually, a great deal of trouble is often met with at

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crossings, especially when one or both lines are double track, the tendency being to drag the adjacent crossings out of line in opposite directions, and in this way double the effect in rough-riding track.

The movement of rails is caused by many other influences. The forward movement of the rails is due to the passing of trains. Trains in motion, running beyond a certain speed, tend to carry with them by the wheel friction and the momentum of the rolling load, the rails on which they run. The unequal wheel friction in going round curves, especially at places where brakes are applied, aggravates the tendency of the rails to creep. The effort made in travelling up rising gradients with heavily laden goods trains increases in like manner the backward travel of the rails. Rail movement often takes place owing to greater vibration at certain points, such as at bridges and trestles and the approaches to them, where the tendency of rails to creep is sometimes excessive.

The creeping of rails often forms a difficult problem for the maintenance engineer to deal with. Rail creeping is inconsistent; one rail is often found to creep considerably more than the other, or even to creep in an opposite direction. This is especially in evidence on curves, where the outer rail generally moves more than the inner, owing to the greater pressure exerted on the former. The lower rail frequently moves more when the elevation of the curves is too great.

Rail creeping, of course, proceeds in the direction of the heavier traffic, and for this reason is much greater on double track where traffic is in one direction on the respective pairs of lines. On single track, where the tendency to move in one direction is resisted by the traffic in the opposite direction, the movement is naturally compensated, and we find the rail movement equal to the net balance of the effect of the traffic.

It is often necessary to take measures to deal with the creeping of the rails on single track, which has not needed this attention previously to the construction of a second track, as the single direction running at once brings rail creeping into existence which was not formerly noticed. Other conditions being equal, the movement of single track will usually be downgrade, while on double track this movement is increased on a descending grade, owing to the faster speed on these grades, and the more frequent application of brakes.

Rail creeping has been presumed to result from the wave action set up during the passage of trains. Rails being in sections of 30 or 35 ft., the length of track does not act as a continuous beam which would get back into place after the passing of the load. Each section, to a large extent, acts independent of the others, adjusting itself on the joints.

Rail movement, and general displacement of track, naturally is much in proportion to the manner in which the permanent way has been laid. When the road bed and ballasting is good, rail creeping is not so prevalent as where sleepers have been laid on soft or marshy ground and are practically unballasted, such as in the case of some lines in the Argentine.

Rail creeping is especially in evidence, forming an expensive item in maintenance costs, on quick-transit railways, particularly on metropolitan lines operated by electric traction, with trains running at intervals which are constantly becoming shorter, while the trains are continually becoming heavier. The movement of rails on electrically-operated track forms a more serious problem to deal with, from the point of view of its effect on the electric working of the line, than on steam lines. In designing the track, special precautions are necessary if direct-current working is adopted. In such cases there must be no direct connection between the lines of rail which has any materially greater conductivity between rail and rail than the wooden sleepers.

It is necessary to take special care in designing those appliances which are intended to keep the rails in exactly the same position relatively to the track and relatively to each other. That these particular devices are of special importance in the case of quick-transit metropolitan lines is well known to every permanent way engineer, for it is necessary in some lines, in spite of the great amount of traffic, to have curves with a radius as small as 90 and 80 metres (4½ and 4 chains) and to have gradients which are even to be avoided in the building of ordinary highways. In such conditions the great importance of efficiently anchoring the lines against creeping has been fully recognised.

Whilst it is well known that the rails acted on by rolling loads become displaced in the direction in which the trains run, as we have mentioned above, creeping is very irregular, taking place both at curves and straight track. This creeping is the cause not only of the direct displacement of the track, but also of a large number of other objectionable phenomena. One of the causes of rail movement is undoubtedly the percussive action of the wheels at the joints, when the wheels leave the trailing rail end and strike the facing rail end, the blow given to the rail producing a force which tends to drive the rail forwards in the longitudinal direction. In one case, where considerable creeping of the rails upon a tramway took place, the trouble disappeared as soon as the rail ends, which previously had become worn and battered, had been welded.

Numerous types of anchors and clip stops have been adopted as remedies against rail creeping. The principal types are divided into those which are bolted to the rail web and spiked to the sleeper, and those which are fastened to the rail flange and bear against the side of the sleeper. Appliances, the efficiency of which depends upon the keeping in place of a small wedge, appear unsatisfactory owing to the tendency in practice for the wedge to work loose, and screw attachments need great attention, as it is impossible to say without individual examination in each case whether they are doing their work.

The leading qualities which an anchoring device should possess are the following:

(a) It must act not at the joint, but at any desired point, on the intermediate sleepers, in number to suit the amount of traffic.

(b) It must not weaken the rails and sleepers by making holes or notches in them necessary; nor must it increase the number of fastenings of the bolt and nut kind, as these require special attention.

(c) It must be easy to fit and maintain; weigh little and be inexpensive.

(d) It must be possible to fix the appliance without trouble at every point of the track, independently of the arrangement and dimensions of the joints, the sleepers, and the ballast.

(e) The equality of the flexure of the rails must not be disturbed by the anchor.

(f) It must be possible to use the anchor at points and crossings, where it must be as effective as on the open lines.

(g) It must not make the maintenance of the track more difficult.

(h) It must not involve any appreciable increase in the cost of maintenance over and above the cost of the anchor and fixing the same.

The subject of rail creeping and the means of its elimination form such an important problem, that these notes, for which we are indebted to Messrs. L. P. Winby and Company, may be of interest.

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TRAMWAYS AND LIGHT RAILWAYS ASSOCIATION.

PROGRAMME OF THE ANNUAL CONGRESS.

The Annual Congress of the Tramways and Light Railways Association, as already announced in these columns, will take place at Newcastle-on-Tyne on July 16 and 17. Special dining cars will be attached to the train leaving King's Cross at 2-15 p.m. on Wednesday, July 15, and those who wish to travel by this train should communicate with the secretary, Mr. A. D. Turckheim, at Caxton House, Westminster, S.W. The secretary will attend at Central Station Hotel, which will be the head-quarters, at 9 p.m. on Wednesday, July 15th, when the Congress badges will be distributed.

The following is the official programme:

THURSDAY, JULY 16.

10 a.m.—Reception by the Right Hon. the Lord Mayor of Newcastle-upon-Tyne, Connaught Hall, Blackett Street, Newcastle.

10-30 a.m.—Papers and discussions.

"Some features of Newcastle Corporation Tramways," by Councillor R. Mayne, J.P., vice-chairman Newcastle Corporation Tramways Committee.

"Tramway Experiences in Brazil," by Mr. H. M. Sayers, M.I.E.E.

"Standard Tramway Rails: A Comparison of English and Foreign Sections," by Fred Bland, M.I.Mech.E. (Member of the Council).

3 p.m.—Cars leave Central Station for Jesmond Dene, where the Lord Mayor and members of the Corporation will entertain the delegates at a garden party.

7-30 p.m.—Banquet at Tilley's Rooms, Market Street, given by the Lord Mayor and members of the Corporation.

FRIDAY, JULY 17.

10-30 a.m.—Connaught Hall: Papers and discussions.

"Rail Joints: Their Construction and Maintenance," by Mr. R. Humphreys, tramways engineer, Birmingham and Midland Tramways Joint Committee.

"Town Planning," by Mr. J. A. Brodie, city engineer, Liverpool Corporation.

2-15 p.m.—Newcastle Quay: Departure by special steamer, provided by the Corporation of Newcastle: Trip on River Tyne.

4 p.m.—Arrival at Tynemouth: Tea at Tynemouth, given by the chairman and directors of the Tyneside Tramways and Tramroads Company.

5-30 p.m.—Return to Newcastle by special steamer. (Members wishing to return by land can do so by tramway or by electric train.)

9 p.m.—Supper and dance at Tilley's Rooms, Market Street, given by the chairman and directors of the Northern General Transport Company and the Gateshead, Tynemouth, and Jarrow Tramway Companies.

On Saturday, July 18, special breakfast cars will be attached to the train leaving Newcastle at 8 a.m. for the use of members. A large number of members have intimated their intention to be present, and a record attendance is anticipated.

LIGHT RAILWAYS ACTS, 1896 AND 1912.

The Board of Trade have issued the report by the Light Railway Commissioners of their proceedings up to December 31, 1913, and the report of the proceedings of the Board of Trade, under the above-mentioned Acts, up to the same date. On December 31, 1912, three Orders were before the Board of Trade awaiting confirmation; one of these was confirmed in the following year, one was withdrawn, and the remaining one is still under consideration. During 1913 11 fresh Orders were submitted to the Board of Trade by the Light Railway Commissioners for confirmation. The Board considered each Order with special reference to the points mentioned in section 9 of the Act of 1896, and made such amendments in the Orders as were deemed necessary. Six of the Orders submitted during 1913 were confirmed in the year, making, with the one above referred to, a total number of seven Orders; two have since been confirmed; and the remaining orders are still under consideration. In no case did the Board refuse to confirm an Order. The Orders confirmed in 1913 authorise about six miles of line, at an estimated cost of £81,487. Since the date of the last report, the Treasury have conditionally promised a special advance under section 5 of the Act of 1896, as amended by section 5 of the Act of 1912, not exceeding £45,000, towards the construction of the proposed Mid-Flintshire Light Railway, and also a special advance, not exceeding £12,625, towards the construction of the proposed Fraserburgh and Rosehearty Light Railway, in place of the grant of £17,413 previously promised in aid of the line as originally proposed to be constructed from Fraserburgh to New Aberdour. In October, 1913, the Board issued amended rules with respect to applications to the Light Railway Commissioners under the Light Railways Acts, 1896 and 1912.

INTERNATIONAL TRAMWAYS AND LIGHT RAILWAYS UNION.

EIGHTEENTH BIENNIAL CONGRESS.

The eighteenth biennial congress of the Permanent International Tramways and Light Railways Union will meet on September 7 at Budapest. The Austrian Government has accorded its patronage to the congress, and the meetings will take place at the National Museum. A list of the papers to be read was given in our issue of December 11, 1913, and we now append the provisional programme which has just been issued from the secretariat of the Union, 23, Rue d'Arlon, Brussels.

Sunday, September 6.

9 a.m.—7 p.m.: An office will be open at the National Museum, where members may sign the register, receive papers, etc.

8 p.m.: Reception by the local committee.

Monday, September 7.

10 a.m.: First session of the congress.

Evening: Reception at the Zoological Gardens by the Municipality of Budapest.

Tuesday, September 8.

9-30 a.m.: Second session of the congress.

Afternoon and evening: Excursion on the Danube by trains and special steamers to Visegrad by the invitation of the two great electric tramway companies of Budapest. Dinner will be served on the steamers.

Wednesday, September 9.

9-30 a.m.: Third session of the congress.

8 p.m: Banquet tendered by the Royal Hungarian Government.

Thursday, September 10.

9-30 a.m.: Fourth session of the congress.

4 p.m.: Automobile excursion into the mountains and environs of Budapest. Tea at the Pressburg Mountain by the invitation of the local committee.

September 11-13.

Two excursions will be offered to ladies and gentlemen by the local committee, one to Tatra, the Switzerland of Hungary, and Mezohegyes, a great Government estate, and another to the lower part of the Danube and Herculesbad.

As Glasgow and Leeds Corporations are now members of the Union and other Tramway Committees are discussing the desirability of their also joining the Union, the Articles of Association will be of interest to many, and we append a translation of them.

ARTICLES OF THE INTERNATIONAL UNION OF TRAMWAYS AND LIGHT RAILWAYS.

ADOPTED ON SEPTEMBER 24, 1886, AND AMENDED ON SEPTEMBER 21, 1906.

Article 1.—Object and Headquarters.

The International Union of Tramways and Light Railways has for its object the study of all matters concerning the tramway and light railway industry, with the purpose of promoting the progress of that industry, both from the technical and economical point of view, and from that of the public interest.

With this object to wit:

(*a*) It organises periodical and international congresses;

(*b*) It maintains a bureau of information, which furnishes to all its members, upon their request or periodically, the results of researches upon special questions, or of tests made in the installations of various countries, or upon any other information which concerns the tramway and light railway industry;

(*c*) It publishes detailed reports of its congresses, papers and divers other documents relating to its work;

(*d*) It promotes fraternal relations among its members.

The headquarters of the Union are at Brussels.

Article 2.—Members.

The Union consists of effective members, effective personal members, associate members, personal associate members, and honorary members, as stated below:

(*a*) Effective members: Undertakings, companies, and associations of tramways and light railways. These members are represented by one delegate appointed by each undertaking.

(*b*) Effective personal members: Directors, managers, engineers, and the higher officials of such undertakings, companies, and associations mentioned above, as are themselves affiliated to the Union.

(*c*) Associate members: Firms, companies, industrial associations, public bodies, or others who, although not themselves working tramways or light railways, are interested in the industry.

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They are represented in the Union by a delegate appointed by each undertaking.

(*d*) Personal associates: Persons who are interested in the tramway and light railway industry and who, by their positions, do not belong to the category of members designated under Sect. *b*. The officers of firms, companies, associations. or administrative bodies included under the above designation (Sect. *c*) will not be admitted unless the undertaking to which they belong is itself affiliated to the Union.

The Council decides on applications for admission to the Union. These applications must be made in writing.

The General Assembly of the Union has the power, upon the nomination of the Council, and by a majority of members voting, to elect honorary members.

Article 3.—Administration.

The Union is administered by an international managing committee, composed of not less than seven members and not more than 15 members, nominated at the general assembly by the majority of members voting.

Only the delegates of effective members and effective personal members are eligible (Art. 2, sect. *a* and *b*).

At each ordinary general meeting a third of the members of the Council retire as determined by lot.

The retiring members are eligible for re-election.

The members of the Council receive no remuneration, but expenses incurred by them in attending the meetings of the Council will be refunded.

Article 4.—Direction.

The Council formulates the rules governing its own procedure. It may replace provisionally members who have died or resigned. In this case the general assembly will proceed to an election at its next meeting.

Immediately after each ordinary general meeting the Council chooses from its members a president and two vice-presidents. These officials may be re-elected.

A quorum consists of not less than a third of the members of the Council Decisions are made by the absolute majority of the members present, and in the case of a tie, the president has the casting vote.

The Council represents the Union. It administers, carries on, and watches over the business and interests of the Union. It arranges for congresses and general meetings, and carries out their decisions.

The Council has power to choose and appoint from its own members an executive committee, and to delegate to such committee all or part of its power.

Article 5.—General Secretary.

The Council has the power to establish a general secretariat, and to nominate, to appoint, and dismiss a general secretary, and to determine his duties and powers.

The general secretary is a member of the executive committee in an advisory capacity. He has a vote if he is a member of the Council.

The president of the Union signs documents or discharges obligations in the name of the Union, and in case of absence or inability he may delegate his powers in this respect to a member of the Council or to the general secretary.

The Council and the general secretary have their offices at the headquarters of the Union in Brussels.

Article 6.—Commissions and Investigations.

The Council have the right to nominate commissions composed of members of the Union, or others, to investigate questions submitted to them.

Article 7.—Congresses and Ordinary General Meetings.

At least once in two years, members of the Union shall meet in congress, the ordinary general meeting taking place afterwards. The place and time of the congress and of the ordinary general meeting shall be fixed at the preceding general meeting.

The Council has, however, the right to modify these decisions in case special circumstances require.

The ordinary general meeting verifies and approves the statement of accounts covering the period since the previous general meeting; grants discharges to the Council; and also examines and approves the budget of receipts and expenses for the next general meeting.

Article 8.—Extraordinary General Meeting.

The Council has the right to call an extraordinary general meeting.

It shall give three months' notice of an extraordinary general meeting, at the request of two-thirds of the effective members (Art. 2, sect. *a* and *b*).

Article 9.—Programme of the Congress and Ordinary General Meetings.

The notice of the congress and ordinary general meeting must be sent to members of the Union not less than three months in advance.

The Council decides upon the subjects to be discussed at the congress and general meetings.

It must place upon the programme every proposal signed by at least ten effective members (Art. 2, sect. *a* and *b*), provided that a notice of this proposal is given not less than six weeks before the first of the current month in which the congress and general meeting is held.

The final programme must be communicated to the members fifteen clear days before the congress and general meeting.

Article 10.—Languages.

At congresses and general meetings the communications and discussions shall be in French and German.

The publications of the Union will appear in French and German.

The Council shall have the right to issue publications and to allow papers to be submitted in other languages.

Article 11.—Resolutions of the Congress.

The resolutions of the congresses have for their object to give advice and information upon the subjects discussed, but they do not bind the members of the Union.

Article 12.—Votes.

Effective members and effective personal members (Art. 2, sect. *a* and *b*) alone have the right to vote.

The effective members, represented by their delegates as stated above in Art. 2, sect. *a*, take part in the votes, and they have one vote for each 50 francs paid as annual subscription.

Effective personal members (Art. 2, sect. *b*) each have the right to one vote.

Effective members and effective personal members have the right to be represented at the congress and the general meeting by other effective members or effective personal members. These last in this case must be provided with special authorisation.

The mode of voting is fixed by the president of the meeting.

The election of the members of the Council and of honorary members shall be by secret ballot by the majority of members taking part in the voting. The elections may also be made by acclamation.

In the case of a tie, the president of the assembly shall have the deciding vote.

Two tellers nominated by the meeting shall scrutinise the ballots.

Article 13.—Subscriptions.

The subscriptions of effective members (Art. 2, sect. *a*) shall be proportional to the gross receipts of their respective undertakings. They are fixed as follow (1):

For an annual gross receipt of

(*a*)	Less than 1,000,000 francs ..	50 fr. (£2)	per annum.
(*b*)	from 1,000,000 to 2,000,000 francs	100 fr. (£4)	,,
(*c*)	,, 2,000,000 to 3,000,000 ,,	150 fr. (£6)	,,
(*d*)	,, 3,000,000 to 4,000,000 ,,	200 fr. (£8)	,,
(*e*)	,, 4,000,000 to 5,000,000 ,,	250 fr. (£10)	,,
(*f*)	above 5,000,000 francs	300 fr. (£12)	,,

The annual subscription of effective personal members (Art 2, sect. *b*) is 20 francs (16s).

The annual subscription of associate members (Art. 2, sect. *c*) is 100 francs (£4), and that of personal associate members (Art. 2, sect. *d*) 20 francs (16s).

If the receipts are insufficient to balance the expenditure, the deficit shall be provided by the effective members (Art. 2, sect. *a*) and their additional subscription shall be in proportion to the subscription paid by each of them for the last period.

Subscriptions are payable in advance in January.

Honorary members pay no subscriptions.

Article 14.—Resignation of Members.

A member who desires to resign from the Union must inform the president in writing before October 1. Failing this, he will be required to pay the subscription for the following year.

Article 15.—Duration of the Association.

The duration of the International Union is for 50 years from the date of the present regulations becoming effective (2).

Every proposal for an earlier dissolution must be approved by a majority of not less than two-thirds of the members taking part in the voting.

In case of dissolution, the general assembly will appoint a committee of liquidation, which may be the Council.

In the fiftieth year the general assembly will decide by a majority of members present if the Union is to be continued, and in this case, to what period.

Article 16.—Assets.

The assets of the Union are the property of effective members (Art. 2, sect. *a*), who have continued to be members of the Union without interruption for a period of six years. In case of dissolution, the assets will be divided among them *pro rata* in accordance with the annual subscription paid during the last six years.

Article 17.—Amendment of the Rules.

The present rules will become effective as soon as they have been approved by the general assembly (3).

Every amendment to a rule must be approved at a meeting of the General Assembly and by a majority of three-fourths of the members voting.

(1) The decision voted by the thirteenth general assembly, Vienna, September 8, 1904.
(2) September 21, 1906. (3) September 21, 1906.

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THE INCORPORATED MUNICIPAL ELECTRICAL ASSOCIATION.

Congress at Birmingham,

JULY 15th to 20th, 1914.

Great success attended the fourteenth annual conference of the Incorporated Municipal Electrical Association, which was held at Birmingham from June 15 to 20. The members and guests present numbered over 400, and the weather throughout was most favourable, a circumstance that rendered doubly enjoyable the excursions to other cities and places of interest and the open air fête and concert. Mr. R. A. Chattock, city electrical engineer of Birmingham, was most cordially supported by the Corporation and the Birmingham Entertainments Committee in his efforts to render the convention both pleasant and useful. As a prelude the committee entertained the members at a smoking concert on Monday evening, June 15. On the Tuesday morning the Lord Mayor (Colonel Martineau) extended a welcome to the conference in the Midland Institute. The President then gave his address, which was full of practical points, suggesting progress in many directions. It is seldom indeed that a presidential address is so suggestive or goes so far out of the beaten track.

The remainder of the first day's session was occupied with the consideration of a paper by Mr. W. A. Vignoles, chief electrical engineer, Grimsby, on "The Commercial Development of Electricity Supply in Moderate-sized Towns." Luncheon followed at the Grand Hotel, at the invitation of the Birmingham Entertainments Committee, when admirable speeches were made by Bailie Willock and Alderman Bowater, the former in proposing, and the latter in responding to the toast of "The City of Birmingham." The afternoon was most profitably filled up by visits to the works of the General Electric Company, and of Messrs. Bellis and Morcom. At the Witton works of the first mentioned company there was a demonstration of electric vehicles. At the invitation of Messrs. Bellis and Morcom the visitors partook of tea.

Tuesday evening was set apart for the annual dinner, Mr. Chattock presiding over an attendance exceeding four hundred. The chief item of the speeches was the emphasis which was placed by Dr. S. Z. de Ferranti, the President, and Mr. J. F. C. Snell, on the business aspect of the Association and the Corporations it represented. Dr. Ferranti urged that part of their work should be to educate the public to the use of electricity, and the President observed that his experience of the Association was that every endeavour was made to further any desirable object. Admiration of Birmingham Corporation's enterprise in electrical matters was expressed by Mr. Snell, who said he looked forward to a great expansion of the undertaking when the advantages of the new power-station were realised. The cheap supply would benefit Birmingham manufacturers in their competition in the markets of the world.

Wednesday's proceedings were held at Coventry, the Mayor of that city welcoming the visitors in St. Mary's Hall. During the morning consideration was given to Mr. S. E. Feddon's paper on "Design and operation of Boiler House Plant." The Mayor was the host at the luncheon, and visits were afterwards paid to the Coventry electricity works, Daimler Company's motor vehicle works, Coventry Chain Company's works, the British Thomson-Houston motor works, and the Triumph Cycle works. A large party went to Rugby to inspect the main manufactories of the British Thomson-Houston Company and of Messrs. Willans and Robinson. In the evening the Lord Mayor of Birmingham and the Lady Mayoress held a reception at the Council House, when about 600 members and guests were present. The arrangements were of an elaborate nature, the reception being followed by a dance, while musical and other entertainments were given in the council chamber.

On Thursday the Association visited Stratford-on-Avon, where they were officially welcomed by the Mayor, Councillor F. Winter; and Mr. J. H. Bowden, chief electrical engineer of Poplar, read a paper on "The Standardisation of Tariffs." There was a motor car excursion to Warwick, and on returning to Birmingham the members attended an open-air fête and concert in the Botanical Gardens, Edgbaston, arranged by the Birmingham Entertainments Committee.

Mr. Harry Richardson of Dundee, was elected president for the ensuing year at the annual business meeting on the Friday. The meeting passed resolutions of sympathy with Mrs. Bruce Anderson and the B.E.A.M.A. Hearty votes of thanks were accorded to all who had provided entertainment for the members of the Convention and to the workers. Some discussion took place on the dissolution of the Industrial Commiitee of the Institution of Electrical Engineers, and a resolution was passed for the appointment of a special committee to deal with any matters for furthering the supply and use of electricity from public mains, with powers to co-opt outside representatives. A very cordial vote of thanks was accorded to Mr. Chattock for the manner in which he had discharged the duties as president. In the afternoon the Summer Lane power-station was inspected, and in the evening there was a dance at the Grand Hotel. On the Saturday a visit was paid to Worcester. In addition to the social events already referred to, a special programme of attractions was provided for the ladies. The whole of the week's arrangements were admirably carried out.

ADDRESS BY THE PRESIDENT.

In the course of his address Mr. R. A. CHATTOCK expressed regret that the contentious clauses in the model general conditions had not yet been agreed between this Association and the British Electrical and Allied Manufacturers' Association, and that the Electric Lighting Bill had not been brought before Parliament, owing to the opposition element in The Contractors' Association, probably due to the action of those who were opposed to wiring being carried out by Municipal Supply Authorities under any circumstances whatever. He sincerely hoped that a satisfactory agreement would be shortly arrived at. It was unthinkable that supply undertakings could do without electrical contractors.

Adverting to the progress which had been made in developing the use of the electric battery vehicle by the Electric Vehicle Committee, he said that it was impossible for the manufacturers themselves to give extended trials in more than a few towns. It was only by bringing these vehicles before the public that interest would be aroused in them, and for this purpose he considered that supply undertakings should be prepared, themselves to bear some of the cost. Demonstration vehicles could quite well be used in many municipal departments, and money spent in pioneering work of that kind would, he was convinced, amply repay the supply undertaking. It also gave confidence to the public when they saw the vehicles in service, and it enabled first-hand figures as to cost of operation to be given. Up to the present, the expenses incurred by the Electric Vehicle Committee had been met out of the funds of the Association. The Committee felt, however, that their expenses were likely to increase considerably and that it should not be necessary for them to draw upon the funds of the Association in future. They estimated that during the coming twelve months their requirements in this respect would amount to £200, and, with a view to meeting this expenditure, they were approaching the various municipal electric supply undertakings with a request that they should each contribute from one to three guineas towards this fund. They had also approached the manufacturing firms and others interested commercially in the movement, and he was glad to say had been met by a very liberal response. He put forward for the consideration of the municipalities the suggestion that any contributions they made towards these preliminary expenses of the Electric Vehicle Committee would be ultimately repaid to them many times over when the electric vehicle came into general use. He therefore had no hesitation in asking for their sympathetic support in the early stages of the movement.

Alluding to the dissolution of the Industrial Committee of the Institution of Electrical Engineers he said that the report of the Council of the Institution made it clear that the Industrial Committee felt that under their existing constitution and powers they were not in a position to perform useful work. He was of the opinion that all the associations connected with the electrical industry should form from their members a central association, which could arrange conferences to consider disagreements between individual associations, and, if necessary, arbitrate upon the same, and which could be called together by any individual association requiring support in its operations, whether political or industrial.

After criticising a proposal by Mr. Newbigging, chief gas engineer to Manchester Corporation for a combined control for municipal gas and electricity undertakings, the President observed: "If centralisation ever comes, and I feel that it would be greatly to the advantage of the users that it should, it is obvious that it would be quite impossible to arrange for single control of two industries, one of which was purely local and limited to comparatively small and isolated areas, whilst the other was national and capable of being applied over the whole of Great Britain as one concrete system of supply.

"So much for single control—I will now discuss centralisation. Signs have not been wanting for some years past that the question of

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bringing isolated electric supply undertakings under one central system of supply has been occupying the attention of electrical engineers. Especially has this been the case in London, where attempts have been made to amalgamate the various companies operating in that area by the formation of a central supply company. More recently the London County Council has been making very exhaustive inquiries into the same subject, and there is reason to believe is strongly in favour of centralisation of all the supplies, whether company or municipal. In the provinces, too, the larger municipalities have been extending their boundaries, and incidentally taking over the electric supply undertakings belonging to the areas incorporated, with distinctly beneficial results to themselves and to the areas taken over.

"Parliament has also recognised the principle by agreeing to the formation of the various power supply companies which are operating in several counties. All these instances are steps in the right direction, though we are as yet a long way off the goal—where it will be possible to obtain, all over the country and at one rock-bottom price, a supply of electrical energy for any purpose, such as power, heating, lighting (and this will ultimately be such a small percentage of the whole that the poor load factor can be safely ignored), domestic requirements, traction by rail, road, or tramway, etc.

National Importance of a Centralised Supply.

"We are a nation of manufacturers, and to a large extent every inhabitant of this island is dependent upon our maintaining our position in the markets of the world. Our manufactories can only hold their own in these markets if they can produce as cheaply as possible, and one most important consideration towards this end is the provision of cheap power and cheap transit for both goods and workmen. Other countries are recognising this; America and Germany, our two greatest trade rivals, are establishing centrally controlled systems of supply, which cannot fail to have a far-reaching effect upon their commercial welfare. We must do the same unless we are content to take a back seat in the future.

"The larger municipalities in this country, such as Glasgow, Manchester, Birmingham, Liverpool, Leeds, etc., have pointed the way—now it remains for Parliament to tackle the question of nationalisation; whether by means of a Government department, or a public board of management, such as the Port of London Authority, or a private company, subject to limitations as to dividends and prices to be charged for current supplied, is yet to be seen. Until some such scheme is brought into operation, it is useless to expect any marked reduction in the cost of producing and distributing electrical energy below that obtaining in the large power-stations now operating in this country. It is only by tackling the problem boldly, by being prepared to supply current at prices much lower than are ruling at present, and recognising that for a few years there must necessarily be a deficit on the large initial expenditure incurred, that it will be possible to attract and develop the large volume of business that will be necessary to make such a scheme a financial success in the future. It will be as necessary to face expenditure in pioneering work for this scheme as it was in the early days of electric lighting, with this difference however, that the returns to be expected should come very much sooner. If such a policy is ever decided upon, it must be strictly adhered to, and it should incorporate the following outlines.

"Large bulk supply power-stations should be installed in various parts of the country having regard to the three following chief requirements: Proximity of an ample quantity of coal, proximity of an unlimited supply of water for condensing purposes, and proximity of the various large centres of industry where the major portion of the energy is likely to be required. Railways, of course, cover practically the whole of the country, so that these can be fed economically at any point or points throughout their length." Discussing the position under such a scheme of the engineers who were at present in charge of the isolated supply stations, he remarked that electrical engineers had to be managers of their businesses as well as engineers-in-charge, and the business control was every bit as important as was the engineering control. The commercial side of the business was so dependent upon technical matters that it was necessary to have an engineer at the head. He did not see, therefore, that there need be any apprehension in the minds of the existing engineers-in-charge that they would not be required if such a scheme came into being. He suggested that the large municipalities, who at present controlled the major portion of the bulk supplies in the provinces, should meet together and discuss the matter, and, if possible, formulate a satisfactory scheme which could then be brought jointly before Parliament to be subsequently developed on proper commercial lines.

The address was most cordially received, and on the motion of Alderman Bruce (Sunderland) and Mr. H. Richardson (Dundee) the President was heartily thanked.

A PROBLEM FOR MODERATE-SIZED TOWNS.

The first paper, which may be described as a monograph, was entitled "The Commercial Development of Electricity Supply in Moderate-sized Towns." The author, Mr. W. A. Vignoles, chief electrical engineer of Grimsby Corporation, covered an enormous field, but he gave an excellent and suggestive summary in opening the discussion. The paper should have the special attention of every engineer who is inclined to belittle the commercial side of his work. Every electric supply undertaking, like every tramway, is first of all a commercial enterprise; and we are glad to see that municipal engineers are coming at length to appreciate the fact that their principal energies should be devoted to extension of their businesses. Good engineering is essential, but there are more capable engineers than there are men of good business enterprise.

The discussion though naturally, in view of the extent of the subject, somewhat discursive, served to bring out very clearly the agreement of the members with Mr. Vignoles' ideas on this point. A remark of Mr. Feddon, of Sheffield, that he had come to regard electric lighting as a sort of by-product shows how rapidly the municipal engineers are now assimilating ideas which in the early days of power supply were the possession of comparatively few.

Mr. Frank Ayton said that in Ipswich the Corporation electricity department adopted advertising ten years ago, but could trace very little result until the last few years. Advertising on the tramcars had proved very valuable, and the type of notice containing few words had excited most interest. Last year the expenditure on advertising amounted to £140. Adverting to the author's suggestion that the Association should appoint a committee with power to confer with the Electricity Supply Publicity Committee to endeavour to formulate a scheme of co operative advertising, he said he hoped that Mr. Vignoles would bring forward a resolution in regard to the suggested committee.

Mr. A. H. Seabrook (Marylebone) said the Association was a splendid co-operative movement, and he supported the suggested committee.

Mr. S. E. Feddon (Sheffield) remarked that in his city it was still found advisable to use every opportunity for exhibiting and demonstrating electrical apparatus. It was better to make the mistake of laying mains too large than too small. In Sheffield lighting was a by-product and advertising agent.

Mr. G. Hoadley (Maidstone) said that his Council encouraged contractors, and found practically all their work for them.

Mr. A. Cramb (Croydon) had found showrooms very valuable. Development work was well worth paying for, but some central publicity organisation was essential. Contractors were a valuable asset to the undertaking.

Alderman Fred Smith (Liverpool) said he would not be a party to any pooling arrangements with contractors.

Councillor Crowther (Sheffield) contended that profits should be used for developments and not for relieving the ratepayers.

MODERN BOILER-HOUSE PLANT.

On the morning of June 17 the members travelled by special train to Coventry, where they were welcomed by the Mayor.

Mr. S. E. Feddon, chief electrical engineer, Sheffield, then introduced his important paper on "The Design and Operation of Modern Boiler-house Plant." Adverting to the facilities for disposal of ashes, he said that that point was becoming a serious source of expense and concern in large cities because of the difficulty of obtaining tips within a reasonable distance of the station. The increased expense could quite appreciably increase the cost per unit, so that at a certain point it was necessary to take into consideration whether it was not worth while to buy a high price coal with a minimum percentage of ash. The author had lately gone to considerable expense in dealing with ashes by the installation of a ropeway over a steel bridge erected across a main line of railway, so that the ashes could be tipped in an adjacent valley. The cost was 1s. 3d. per ton, as against 1s. 11d. by cartage and 2s. 9½d. by railway.

In the matter of facilities for getting in coal it was advantageous to choose a site having a high-level siding, so that trucks came in straight off the railway over the top of the bunkers, thereby doing away with the expense of installing and running coal conveyors. Although the problem looked rather a formidable one the author had arranged his Neepsend power-house on the foregoing plan, and an expensive looking site had turned out to be a cheap one as regards cost. The capital cost per kw. for the first section of the station was below £10, including the cost of land and sidings. There was a three weeks' supply of coal opposite each boiler on the siding level, and each boiler had a shoot holding about 100 tons of coal, which fed by gravity into the mechanical stoker hopper. An electrical traverser was used for the transference of the trucks over the five railway lines above the tops of the bunkers. The shoots were fitted with measuring chambers and indicating gear, and the author disproved the contention that measuring chambers were most inaccurate. While not supporting the argument that warming water by live steam saved coal, he conceded that any loss incurred by that practice was repaid in the saving of repairs to the economiser and boiler tubes. A suction ash plant was about to be put in for all new boilers, and eventually for the old ones, by which it was expected that considerable labour would be saved, and much dirt, dust, and soot done away with.

Selection and Rating of Boilers.

There was an economic limit to the high rate of combustion, both as regards efficiency and maintenance, which all engineers aimed at

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getting, and it was comforting to feel that boilers could be pushed to 40 or 50 per cent. above their normal working load in case of emergency. In the event of a very high rate of combustion becoming general and proving itself satisfactory, there would have to be a redesigning of the boiler combination.

The author considered with his present knowledge that the best overall efficiency and least maintenance cost is obtained by running the following combination:

Water-tube boilers.
Economiser.
Chain-grate stokers.
Induced fan draught.
At 25 lb. of coal (rough engine slack) per sq. ft. grate area:

Evaporation per sq. ft. of heating surface	5·25 lb.
In-going gases to economiser	450 deg. Fah.
Out-going gases from economiser	300 deg. Fah.

though it was quite impossible to burn the same class of coal up to 30 lb. per sq. ft. of grate area with good economy.

With regard to the rating of the water-tube boilers, it was a matter of common knowledge that the rate of evaporation in the neighbourhood of the furnace was very high compared with other parts of the boiler. As the rate of combustion increased so did the rate of evaporation with the same size of boiler. The author had noticed that manufacturers had put forward for different capacities similar sizes of boilers, but with stokers having a larger grate area, so that some standard as to rating should be adopted. The standard adopted by the electric supply department at Sheffield was that the normal evaporation should be obtained by burning 25 lb. per sq. ft. of grate area with a chain grate stoker burning engine slack.

The author had lately installed some 8-ft., Class E. underfeed stokers to two water-tube boilers fitted with both forced and induced draught. The boilers were specified to evaporate 35,000 lb. of steam each from and at 212 deg. Fah. The combination was as follows:

Water-tube boilers.
Economisers.
Underfeed stokers.
Induced draught fan, H.P. on load 55, giving 1·3 in. draught.
Forced draught fan, H.P. on load 30, giving 2 in. draught.
Normal coal per square foot of grate area, 33·5 lb.
Evaporation per square foot of heating surface, 5·25.
In-going gases to economiser, 518 deg. Fah.
Out-going gases from economiser, 290 deg. Fah.

The results were: Burning up to 47 lb. of coal per square foot of grate area under the above working conditions the boiler evaporated 58,000 lb. of water per hour from and at 212 deg. Fah., but the heat of the brickwork was so intense after the first hour's run that the rate of burning was reduced to 38 lb. per square foot of grate area. The superheater was not designed to deal with this large amount of steam, the temperature being reduced from 150 under normal conditions to 110 deg. Fah. The author thought that this combination had a great future before it and its limit would be determined by the ability of the brickwork, etc., to withstand the intense heat generated in the furnace with the above conditions.

Form of Draught and Mechanical Stokers.

Another important consideration was the form of draught to be employed—natural, induced, Pratt's, or forced? There were many claims that the natural draught system was the right and most economical one, but it lacked flexibility, and made it so dependent on atmospheric conditions, good coal, etc., and many instances were recorded where generating stations had been started with high brick chimneys where at a later date fans had had to be added to secure the necessary flexibility and draught. The author was a believer in mechanical induced draught, and when considering the problem strongly advocated that care should be exercised to install a fan or fans capable of dealing with the worst atmospheric conditions and of dealing with sufficient gases for the maximum possible overload of the plant. Regarding the hot versus cold-air systems of induced draught, it would appear that the latter should be the more economical, owing to the smaller power said to be required to deal with the lesser volume. The author investigated this matter some three or four years ago, but could not satisfy himself that there was any very great benefit to be derived, besides which the cold air injector was expensive to manufacture and renew.

A decision with regard to the type of mechanical stokers was difficult to arrive at. The ideal stoker should be able to deal with clean nuts or smudge, should be able to get to full duty from banked fires in the shortest possible time, should be capable of doing 50 per cent. above its normal duty for short periods in case of emergency, should consume all combustible matter fed on to it with the most efficient percentage of CO_2, should be smokeless under all conditions, besides which it must be strongly built, reliable, and easy of access for the repair of the working parts or the renewal of the bars. These conditions were, of course, difficult of attainment in one stoker. For small grates there are many good and reliable stokers on the market in Britain, but with the larger grates now required the choice was focussed down to two or three. The chain grate had in the past done yeoman work, but it had its weak points, such as the difficulty of burning mixed slack and the difficulty of keeping an even covered grate, the prevention of unburnt coal being dumped, the extra labour in handling riddlings which filter through the grate before coking takes place, and it was unable to comply with many of the requirements set out above. However, when the improvements now being carried out on it were perfected and proved satisfactory in working, no doubt it would come much nearer to the ideal. The underfeed stoker, which had recently been enlarged and strengthened in its mechanical parts, had proved itself, from the author's experience during the last 18 months, most satisfactory, and complied more nearly with the conditions before mentioned.

The author therefore considered that the safest arrangement for a large boiler house was to install a certain proportion of the old reliable chain grate, which had proved satisfactory over a long series of years, and the remaining portion of the newer type, which, while being excellent from results obtained in a comparatively short time, had yet to prove its superiority over a longer period.

The paper gave valuable information on the storage of coal, which was a matter to be considered in the near future by all engineers, in order to cope with emergency caused through strikes. The author also dealt with the suggestion that large electric power-stations should be equipped with by-product plants. Finally, he wishes to impress on all the great importance of a present-day boiler house and plant; it was, in fact, of paramount importance, where more money could be saved than anywhere else in a power-station, by employing and paying highly-trained and capable men who could bring scientific knowledge to bear on the many important problems that presented themselves for investigation.

Mr. W. W. Lackie (Glasgow) referred to valuable information he had gained during a visit to America, and mentioned that the use of indicating instruments in the boiler house and the institution of special tests had resulted in a saving of £10,000 in one year at Glasgow. He had found suction ash plant very satisfactory. Under certain conditions and with coal at less than 10s. a ton it might pay to use gas firing and recover the by-products. He was equipping two boilers with an American stoker, which was specially designed for giving the excess steam required for meeting sudden loads.

Mr. J. W. Beauchamp (West Ham) said that his experience of suction ash plant was that it appeared to be the most practical method of dealing with ashes.

Mr. W. C. P. Tapper (Stepney) urged that for gas firing and by-products they should go to the gas people who were specialists in those lines.

Mr. Yorath Lewis made some interesting references to the Niclausse boilers installed at Southend, which were described in The Tramway and Railway World of June 11. He observed that this plant, by giving a very high steaming capacity per unit area, greatly helped to solve the difficulties of design introduced by the turbine.

Mr. Bailey (Birmingham) spoke of the satisfactory results obtained from stacking 10,000 tons of coal at his works. The only deterioration was on the surface, and the stack was free from sulphur.

Mr. F. Ayton (Ipswich) made a suggestion that by forcing competition with gas interests they might obtain reasonable offers in regard to gas firing. A bonus was given by his committee to all employees for the reduction of coal consumed.

Mr. Robert Hammond observed that while in South Africa he had found the Vereeniging plant, which employed the Pratt induced-draught system, operating almost smokelessly on full load.

Dr. Ferranti observed that the heating of air for combustion had not proved a satisfactory method. If by-product recovery on a paying scale and gas firing were to be adopted for electrical plants, the gas making processes in use would have to be revolutionised.

RAILROAD SURVEYING.

"Railroad Surveying" (272 pp., 7 in. by 4¼ in., by ¾ in. Gilt edges. Limp cloth cover. 1914. J. Wiley and Sons, New York. Chapman and Hall, London) is the work of G. W. Pickels and C. C. Wiley, joint authors, who are respectively Instructor and Associate in Civil Engineering at the University of Illinois. In the preface it is claimed that although the subject-matter occupies considerably less space than in the ordinary hand-book, it "covers all phases of the subject thoroughly." The treatise is, at least, an eminently practical one, and numerous tables are presented in very clear type, and with suitable intervals. The minute details given of the different settings out and measurements recommended are much beyond anything usual in this country. All the tables and formulæ are for 100 ft. chains, though their use is only mentioned incidentally. Each man's duty in transit, level, topography, and land-line parties respectively, are set out, and read rather quaint to old-fashioned ears. For instance, part of the rear chainman's duty, besides holding "his end of the tape on the last stake driven," is "to take a record of all plusses." Part of the rodman's (*Anglice*, staffholder) duty is to keep "peg notes." Another suggestion we venture to make is that the various abbreviations be tabulated, instead of being described on their first occurrence in the text.

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THE WITTON WORKS OF THE GENERAL ELECTRIC COMPANY.

One of the visits made by the members of the Incorporated Municipal Electrical Association during their recent annual conference in Birmingham was to the works of the General Electric Company at Witton. This inspection took place on Tuesday, June 16 As a prelude to this visit a large party of representatives of the Press were invited to go over the works on Monday, June 15. They were received by Mr. Hugo Hirst, chairman of the company; Dr. Railing, Mr. Clifford Palmer, Mr. Heaton, and others. The great workshops, which were very busy, were thoroughly inspected, and a visit was afterwards paid to the company's Ileene works at the other side of Birmingham. When one takes into account the works of the company in other parts of the country, it is not surprising to learn that the total number of men employed is about 10,000. At Witton the facilities for recreation, both indoor and outdoor, for the employees are admirably complete.

The Witton works are the head-quarters of the company, and here is manufactured electric plant in the largest sizes, including turbo-generators, slow-speed alternators, continuous-current motors and generators, motor generators, rotary converters, phase advancers, and other similar machines, in addition to switchboards for high and low-pressure work and all classes of switch gear, fans, vacuum cleaners, arc lamps, electric conduit, primary batteries, and arc lamp carbons.

The company's central stores are a large building, 350 ft. long and 50 ft. wide, three storeys high. There are in stock some 30,000 different articles manufactured by the company in their various works, and from these stores the goods are sent out to the company's home and foreign branches. It should be mentioned that the whole of the machine tools in the works are driven electrically, the energy being derived from the company's own power-station, where there are three generating sets, one turbine-driven of 1,000 KW. and two slow-speed sets of 250 KW. each.

Extensions are now in progress, including a new bay to the engineering shop, a new test house, and mica shops. The company's meter works are about to be moved from Salford to Witton.

The following list gives an indication of some of the heavy work in progress at the time of the visit: 750-KW. motor generator set, for Melbourne; some 3,000-KW., 3,000 revolutions per minute turbo-generators, for Rochdale, Bury, and Southwark Corporations; some vertical 3,000-volt, 1,470 revolutions per minute motors, for the Rand Water Board; two very large direct-current rolling mill motors, for a steel works; a large number of rotary converters, for Southwark Corporation, City of Santos, and Sydney; 400-H P. three-phase haulage motor, for the Mysore Gold Mining Company.

The Ileene works are of considerable size. The main building, comprising four floors and basement (each floor having an approximate superficial area of 8,000 sq. ft.), is exclusively used for the manufacture of all kinds of electric light fittings, and also the company's well-known

Parade of Electric Accumulator Vehicles at Witton on June 16.

(Mr. C. A. Chattock, president of the I.M.E.A., and Mr. Hugo Hirst, chairman of the General Electric Company, are seated in the car on the right.)

The main building of the engineering works is 350 ft. long and 210 ft. wide, and every provision is made for turning out large electrical plant. A large gallery at one end is utilised for the erection of switchboards for low, medium, and high pressures. Near by are the arc lamp works, and here the visitors were specially interested in the Angold magazine flame arc lamps, and particularly in the latest design of Angold lamp for use with alternating current. This lamp is provided with a small transformer, so that single lamps can be run economically from ordinary circuits. A recent addition to the works is a large shop—the largest for the purpose in the country—for the construction of fans and small motors. The company now manufacture nearly 20,000 fans a year. Another interesting department which may be mentioned is the arc lamp carbon works, the only thing of the sort in the United Kingdom. By the use of a series of machines the carbon is crushed, converted into paste, squirted into rods, and after being baked in ovens is cut into lengths. There is a wide variety of sizes, and besides the ordinary types. carbons for flame lamps and for kinematograph work are also turned out.

In looking round the extensive foundry, the visitors saw a mould was being prepared for a casting weighing rather more than 25 tons. The casting is for the shell of a 5,000-KW. turbo-generator to be built for the Hackney Corporation. The preparation of a mould for a casting of this size represents something like six weeks' work, and the actual time required to pour is about two hours.

"Magnet" system of electric heating and cooking apparatus, whilst accommodation is provided for stores, offices, test rooms, warehouses, and drawing office, etc., in various other parts of the factory.

MR. HIRST ON POWER SUPPLY AND THE INDUSTRY.

At luncheon given by the directors of the Generai Electric Company in the Grand Hotel to the guests of the day,

Mr. HUGO HIRST, chairman of the company, who presided, thanked the guests for coming to inspect the works, and said he had been asked what was the connection of the company with the General Electric Company of America, with the Canadian General Electric Company, and with the German company whose name was a translation of the same title. His answer was that this company had no connection whatever with any of these companies, either financially or industrially. This company was the offspring of a private concern started 25 or 26 years ago, and they had developed slowly but surely. He hoped that what the visitors had seen that day had convinced them that the company's works compared well with any electrical works in this country; but they were only a part of the company's undertaking. Among other works which the company had were cable works which were just approaching completion, and the directors hoped before long to invite representatives of the Press to an opening ceremony which would demonstrate the last and best thing in cable works. The present gathering was due to the visit of the

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municipal electrical engineers to Birmingham for the purpose of their annual convention. In this connection it might not be out of place to emphasise what an important part municipal engineering had played in the development of the electrical industry. It had had in some respects a very good effect, in others an indifferent effect, and in others a very bad effect. Though 400 or more electric lighting concessions had been granted to municipalities, it remained obviously foolish to do such a thing in connection with electricity, which had no limits, no bounds, least of all parochial bounds. The idea of supplying electric current according to the frontier of a town or village seemed very extraordinary to anyone who would have liked to have done it differently. He was only stating a fact that ought to be grasped by municipalities. The effect had been prejudicial to the industry. In other countries the industry had been able to lay out complete plans for the supply of the large towns, of mining districts, and of manufacturing areas, to follow up its own school of thought in arranging standards, and by doing so to produce something which brought the whole network of electrical supply into the organisation of one or other of the big companies. In this country, owing to municipal electrical supply, it had become necessary for the manufacturer to confine himself to specialities. That might have had the effect that in detail the British electrical manufacturers' goods were as good as or better than anything supplied elsewhere, but they had not had that general experience which would fit them better for the big work that was going on in the rest of the world. A few progressive firms, the General Electric Company among them, had tried to overcome this difficulty by going in for everything electric as a speciality. They were ready to go in for these bigger schemes, and they had executed a number of them abroad, and they had put up a few lonely and forgotten ones in this country. He hoped that would be only the beginning of greater achievements, but British electrical manufacturers had lagged behind the big American and Continental firms, and that was one reason why for a long time they had been compelled to imitate as well as lead. In saying so he was not speaking of his own company, but of the industry generally. The mistake was made some 20 years ago of putting a commercial undertaking in the hands of municipalities. It was now apparent to everybody that if this industrial country was to have electricity supplied cheaply it must find a means of producing it without regard to municipal frontiers. He was afraid that in many quarters municipalities were opposed to that on the mere principle of municipal trading, without considering the facts as they existed. The mistake had to be made good somehow. Another feature which was wanted to make good this grievous mistake of 20 or 25 years ago was this: Electricity supply was a commercial business. Municipalities were not permitted to trade, and yet the electricity supplier was the only natural agent to impress the public as to how electricity could be properly used for the purposes of public requirements. Municipalities were in most cases prevented from having showrooms and proper demonstrations. They could not raise money for hiring out apparatus, as the gas companies did, and generally they were not permitted to indulge in such practices as were commonly considered good business practices. He feared that, unless the Press made it their business to be just to the whole industry by supporting just demands, the country would continue to suffer. At present it was "up to" the manufacturers to create demand, but that was a very inefficient way of doing it. They could not reach the public as well as the man who had his mains and his meters going into the house. Probably the convention of the Municipal Electrical Association would talk about these matters at great length and, he hoped, with some effect.

Interior of Erecting Shop at Witton Works of the General Electric Company.

Mr. R. W. HUGHMAN, in responding to the toast of "The Press," referred to the great growth of the General Electric Company, and said that Mr. Hirst had made a name for himself in connection with the General Electric Company, a name that was known all over the world. In his busy life he had been able to devote himself to the general development of the use of electricity, and a lot of his work was beginning to bear fruit. Mr. Hughman then proposed the toast of "The General Electric Company," to which Dr. Railing and Mr. Harry Byng replied.

After luncheon the guests returned to the Witton works, and subsequently visited the Ileene works, after which many of them returned to London, the hosts thoughtfully providing a special saloon

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car in which dinner was served during the journey. As the party had left Euston at 8-30 a.m., and had been occupied throughout the day, the programme might easily have been found somewhat tiring, but all the arrangements for the day had been so carefully made with a view to the comfort of the visitors that they hardly realised what an amount of work they had accomplished as sightseers within a brief space of time. In our notes on the works we have only touched briefly on some of the principal features, and it will readily be understood that adequately to describe and illustrate the multifarious activities at Witton would require a whole number of THE TRAMWAY AND RAILWAY WORLD. Fortunately several hundred electrical engineers had the opportunity of going over the works on the day following the Press visit, and of seeing for themselves the extent of the work which the General Electric Company is capable of carrying out.

PRESSED STEEL GEAR CASES FOR TRAMWAY MOTORS.

The gear case on a tramway motor is subjected to continuous jolting and vibration. It is carried, of necessity, in an overhung position from the end of the motor, and is exposed to stresses which tend to produce fracture of the supporting lugs. A satisfactory gear case should, therefore, be as light as possible, and the supporting lugs should be of

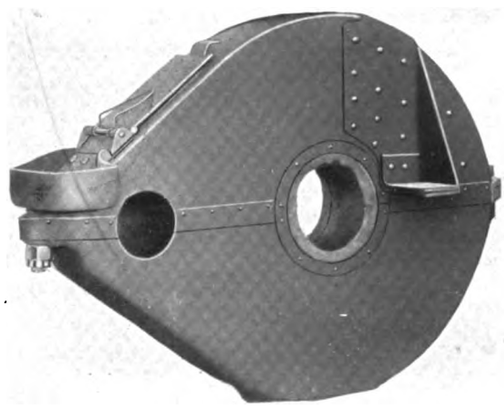

Fig. 1.

rigid construction and designed to distribute the stresses over a large area. Gear cases may be made of malleable cast iron, and the use of this material enables a fairly light case to be made with suitable stiffening webs and strong supports. A demand has arisen, however, for a lighter gear case than can be produced in malleable cast iron, and a sound gear case of pressed steel, weighing only about 65 per cent. of the malleable cast-iron case, has now been produced by the British Thomson-Houston Company, of Rugby, in which each half is jointless, being pressed from a single sheet of steel. The supporting lugs are made of cast steel, and are attached to the gear case by riveting and spot welding. This gear case has been gradually developed during a number of years, and the makers state that it has been submitted to extensive tests on many tramways, with the object of eliminating any feature conducive to failure under severe working conditions.

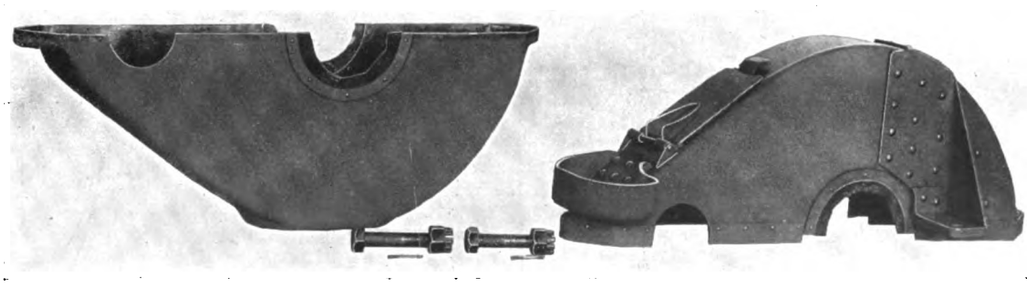

Fig. 2.

This gear case is illustrated in Figs. 1 and 2, which show the general appearance of the case and the method of attaching the supporting lugs. The gear cases are for various makes and types of motors, and fuller particulars and prices are given in a price list issued by the manufacturers.

A "FEARLESS" BRUSH.

Brushes are indispensable for all cleaning and coating processes, but their life is limited to the time during which the bristles, hair, or fibres remain attached to the handle. This is in every case a more or less insignificant proportion of the brush materials' natural life. The Fearless Brush Company, Limited, 26, Hart Street, London, W.C., are manufacturing their specialities under Gerhold's patent—the articles being well described and illustrated in a neat pamphlet entitled "A Revolution in Brush Manufacture." The steps in the process are clearly shown in the annexed four views and hardly need a lengthy

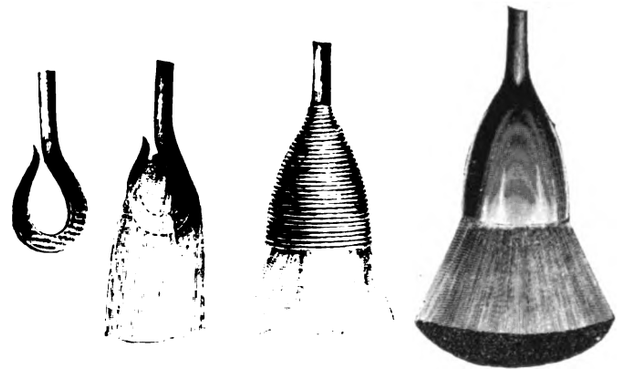

Fig. 1. Fig. 2. Fig. 3 Fig. 4.

The "Fearless" Brush.

explanation. On the hook (Fig. 1), which can be of any desired size and with any design of handle, the bristle, hair, or fibre is slipped in as seen in Fig. 2. The hook can then be clamped or shut, firmly holding the loops of the material. The brush is then bound or served with wire as in Fig. 3, and any desired stiffness may be given to the material left protruding. The wire serving is then soldered as in Fig. 4, forming a neat and indestructible finish to an equally indestructible brush, which lasts till it is worn down to the metal casing. The material of which it is composed cannot become loose, nor is it affected in any way by prolonged immersion in any kinds of liquids, acid or otherwise, or semi-fluid substances, such as tar or glue. The "Fearless" lasts an equally long time in any climate and can stand any amount of rough usage. It is easily cleaned, and that the handle can be of any shape or length desired is plainly evidenced by the 55 different patterns of brushes illustrated and priced in the pamphlet, and adapted to every possible purpose indoor and out, on machinery, on furniture, and for washing and coating purposes whether wash, lime, or paint.

POPULARITY OF TRAMWAYS.

Judging from a leading article in a recent issue of the *Financial Times*, an impression appears to prevail that electric tramways are losing their popularity, although the writer admits that "the electric tramway still serves a very useful purpose and shows signs of regaining some of its lost ground." As a matter of fact, the popularity of the tramway is advancing by leaps and bounds, as the figures from the Board of Trade Tramway Returns demonstrate. In 1902, for instance, the total number of tramway passengers in the United Kingdom was 1,394,452,983, while in 1907 the number had increased to 2,454,807,487, and for 1912-13 the approximate number was 3,219,857,293. Considering that during this period the motor omnibus has come into existence and its use has spread to so large an extent, it is evident that there is little ground for alleging that the electric tramway is becoming unpopular.

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LONDON AND NORTH WESTERN RAILWAY SWITCH GEAR CONTRACT.

We learn that the British Westinghouse Electric and Manufacturing Company, Limited, have secured the contract for the extra high-tension switch gear and connections for 11 sub-stations, in connection with the London and North Western Railway Company's North London electrification. The switchboard panels on order at the present time total 258, comprising 129 high-tension panels and cubicles, 107 direct-current sub-station panels, and 22 low-tension alternating-current and direct-current boards in the main station.

The sub-stations in question are situated at Camden, Queen's Park, Stonebridge Park, Kenton, Pinney, Bushey, Dalston, Broad Street, Willesden, West End Lane, and Acton. There are three rotary converters in each sub-station, excepting at Broad Street and Acton, in which there are two. Of these rotaries, six situated in Camden and Bushey sub-stations are of 1,000 KW. capacity, and the rest of the rotaries have each a capacity of 750 KW. The number of high-tension feeders coming into the sub-stations total 30, and there are also 18 high-tension outgoing feeders.

The oil-break circuit breakers are of British Westinghouse design and manufacture, and are to be of the remote mechanically-operated type, excepting in the case of Stonebridge Park sub-station, where the switches will be of the solenoid electrically-operated type. The switches are of the latest design, and are arranged in such a manner that phase separation can be carried out throughout the whole of the switchboard structure, each separate phase of the switch being contained in a separate tank, and in a moulded stone cubicle entirely separated from the other phases.

The bus-bars are sectionalised in each sub-station, and each machine can be connected through isolating switches to either of two main bus-bar sections. Isolating switches are being provided on each side of the main oil switches. All the incoming feeders will be fitted with reverse-current relays for tripping the oil circuit breakers, and all outgoing feeders and transformer circuits will have overload relays with time limit attachments. The rotary converter extra high-tension circuits will also be fitted with overload time limit relays.

Each section of bus-bar will be fitted with horn type static dischargers combined with the usual resistances and isolating switches. The panels on which are mounted the instruments and handles for operating the oil circuit breaker are situated on the floor level, and behind them are the cubicles containing the oil switches. These are linked to the operating handles which are mounted on the switchboard by means of levers and rods. In the case of the Stonebridge Park sub-station, the operating panels will also be on the floor level, and the switches will be electrically operated.

The cellwork is to consist of moulded stone. The slate panels of which the high-tension control board and also the low-tension switch-boards are made will not be enamelled, but will be finished with a black marine finish.

The low-tension panels, exclusive of battery and booster panels, which form the subject of another contract, deal with 100 outgoing feeders and 31 rotary converters on the direct-current side. The rotary converter circuits are fitted with reverse-current single-pole circuit breakers, fitted with a tripping arrangement for operation by speed-limiting devices on the rotaries. The track feeder panels, which control both poles of one feeder, are fitted with single-pole over-load circuit breakers for 2,000 amperes and two single-pole knife switches for the same current. Sector pattern moving-coil ammeters are used, and have illuminated dials. The circuit breakers are of the well-known Westinghouse type "C" traction pattern, which are in use on so many other traction systems throughout the country and abroad.

In addition to the above panels there are lighting and auxiliary panels in all the sub-stations, and in the power-station a low-tension alternating-current and low-tension direct-current board are also to be supplied under this contract for dealing with the circuits feeding the auxiliary machinery, lighting, etc.

The contract is estimated to be worth between £50,000 and £60,000.

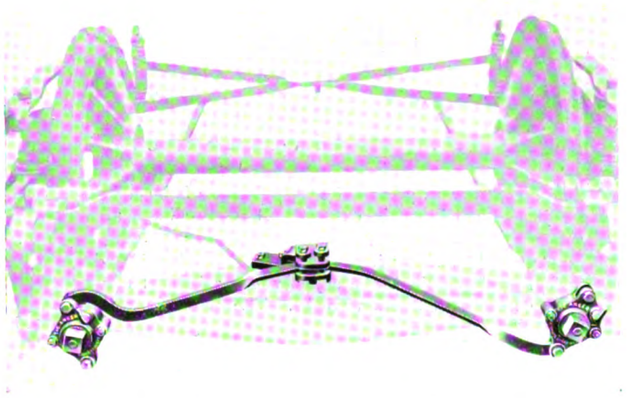
The Institution of Civil Engineers.—The first conversazione held in the new premises took place on July 2. The president, Mr. Anthony G. Lyster, received such a number of guests that the spacious premises were crowded in every part. In three of the rooms engineering models and scientific apparatus were displayed, and proved of such interest that it was difficult to get near some of them or to hear the explanations of the talented exhibitors who, in many instances, attended in person. Corrugated rails taken from different sections of the L.C.C. tramways were shown by Mr. A. L. C. Fell, the general manager; the lighting equipment of a "National" steam omnibus and a grate section showing rocking bars and coke feeders of the new coke motor in action, by Mr. Thomas Clarkson; and a Wimperis recording accelerometer, and equilibristat with a pocket-size indicating accelerometer, by the inventor, Mr. H. E. Wimperis.

THE ANGER IMPROVED BRAKE ADJUSTER.

The Anger Manufacturing and Supply Company, of Preston, have now made important improvements in the Anger automatic brake adjuster, which in its original form has already been described in these pages. The adjuster is, the manufacturers state, in use on a very large proportion of the tramways in the United Kingdom, and it is also employed in most foreign countries where tramways exist. The improvements are the result of actual experience under a great variety of conditions; and still further increase the advantage of using the adjuster.

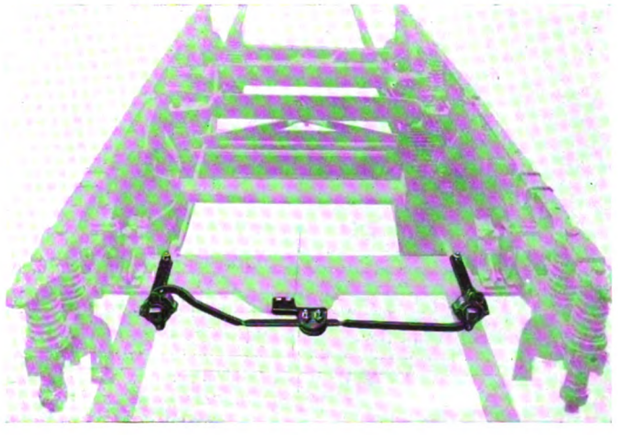
The adjuster is designed so that it it can be applied to any type of truck, either single or bogie, and the accompanying illustrations show its application to several types. The device has been greatly improved by what may be called the elimination of the wearing parts, as the bearing area has been greatly enlarged, so that maintenance cost has become almost non-existent.

The company have also designed a new type of adjustable serrated fulcrum bracket, varying in construction according to the types of truck to which it is to be applied, and suitable for either vertical or horizontal brake levers. It will be noticed that, particularly on single



Brake Adjuster on Single Truck.

trucks, the bracket takes the place of the ordinary fulcrum bracket now used with brakes when the brake lever is on the inside of the brake beams. This new bracket has a serrated face on which is placed a movable serrated cap or washer, so that when in position no more top-operating rods are used, but an operating rod is now introduced to each adjuster, and this method gives a direct drive to each adjuster, and



Adjuster on Single Truck, in which Brake Shoes are Hung Outside Beam.

each has an independent attachment at the fulcrum point. Through the use of this bracket an independent adjustment can be had direct to each adjuster on each side of the truck, which now overcomes any uneven movement of either adjuster, and at the same time it eliminates any uneven wear in the shoes or blocks.

It will also be noticed that instead of the old type bracket, necessitating drilling of holes in different positions according to the clearance

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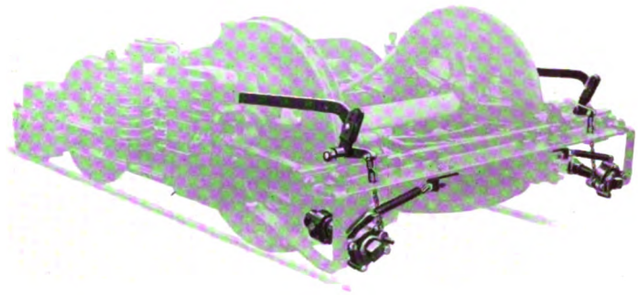
desired between the block face and the wheel, this new bracket enables the shoes to be adjusted to any clearance that may be desired by moving the attachment at the fulcrum point in or out. The shoes can be adjusted as close to the wheels as is required simply by moving the adjustable washer on the bracket farther out, as this causes the brake adjuster to come into action more quickly with a less movement of the brake lever, and if the shoes are too close to the wheels the movable washer can be moved inward, which causes the brake lever to make a further travel before it actuates the brake adjuster.

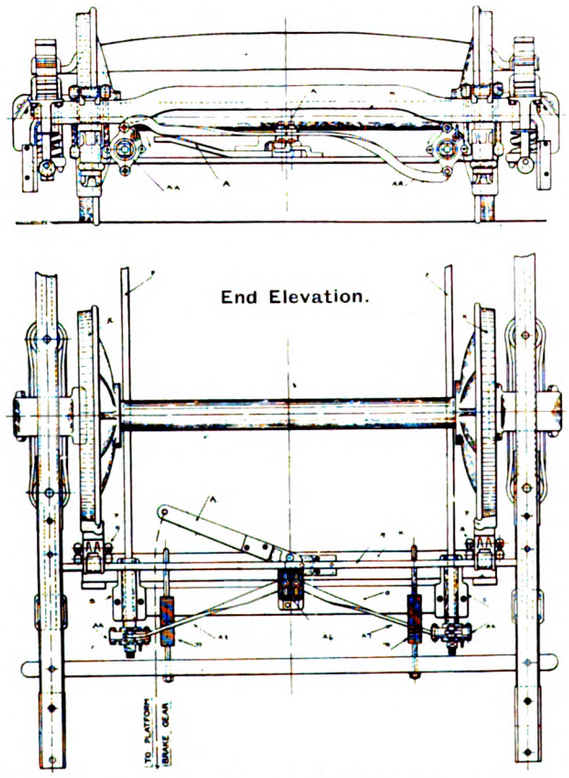
Adjusters with this improvement have already been installed on many systems, and it has been found that it does away with uneven



Anger Brake Adjuster on Maximum Traction Truck.

wear of the shoes. By careful manipulation of the adjustable part, both adjusters will have the exact travel required, and all four shoes will have the same even wear until they are worn out.

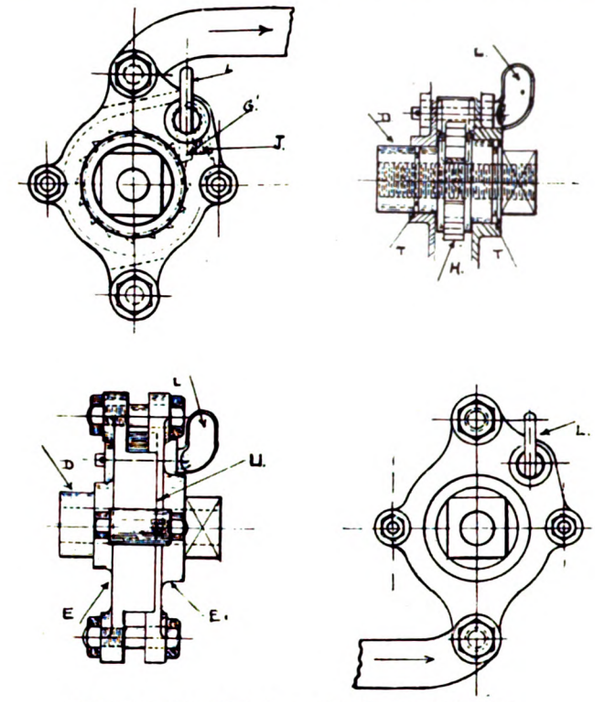
The Anger Manufacturing Company have also introduced their method of applying the brake adjuster to equal-wheel bogie trucks as well as to maximum traction trucks. The views show the device in



Plan of Anger Brake Adjuster on Single Standard Gauge Truck showing New Serrated Fulcrum Bracket.

actual operation. After a long trial it has been found to give the same satisfactory results as on single trucks. In the illustrations it will also be noticed that the adjuster stands out plainly apart from the balance of the truck equipment, and it is clearly shown how simple the parts are, and how easy it is to apply the adjuster in this method of application.

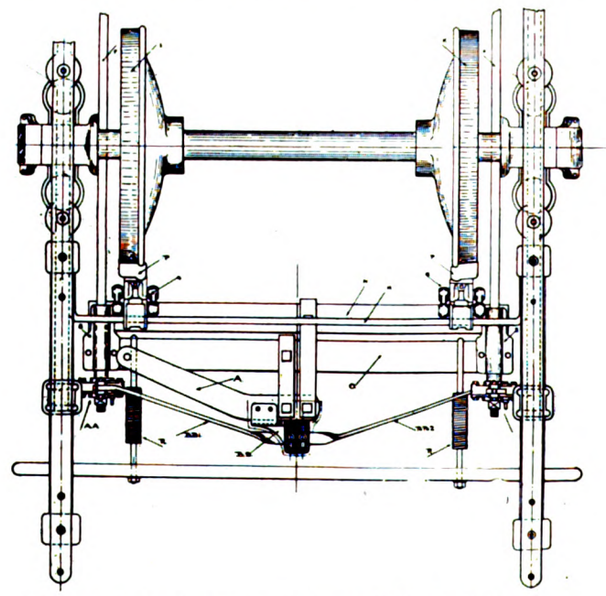
The principle of the device has not been altered, for it is now acknowledged that the principle is correct, as the adjuster works on the brake rods of single trucks and on the turnbuckle of bogie trucks, and at a point in the equipment where its location is back of the live lever or brake lever, and thus it governs at all times the travel of the brake lever, whose travel is regulated by the wear of the shoes. In order to keep the brakes perfectly adjusted, and not to permit the



Anger Improved Automatic Brake Adjuster.

brake lever to travel too far before the operator gets perfect application of all four shoes to the wheels, it is necessary immediately to replace the shoes to their former relation to the wheels before the wear has taken place, and this the device does.

The company guarantee savings in current consumption and in brake shoes, and they have gratifying reports from tramway engineers



Plan of Anger Improved Automatic Brake Adjuster as Applied to Narrow Gauge Truck.

and others of results obtained. They are prepared to supply a sample set of adjusters on approval to any tramway authority, no payment to be made unless the device gives every satisfaction, and unless every claim is substantiated. The company have recently supplied 75 car sets to Birmingham, 150 to Sheffield, 60 to Cardiff, and 180 to the Anglo-Argentine Tramways, Buenos Ayres.

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SIR ALBERT HENRY STANLEY.

The great public service performed by the managing director of the Metropolitan District Railway, London Electric Railways, and the London General Omnibus Company, was fittingly recognised in the Birthday honours by the knighthood conferred on Albert Henry Stanley. Sir Albert has been in London only a few years, but few men have so greatly contributed to the convenience and comfort of the metropolis. His work in the development of travelling facilities in the London district has, in fact, made his name thoroughly well-known not only in London but in every city where the problem of local transport is of importance. Although Sir Albert was born in Derby in 1875, his youth was spent in the United States. He was educated

Sir Albert H. Stanley.

in American schools and technical colleges, and thereafter devoted himself to electric railway management. For 12 years he was manager of the Detroit United Railways and the Public Service Railways of New Jersey. After the Underground Electric Railways Company, of London, had completed their work of construction and equipment, Sir Albert came over from the States and took up the position of manager of the railways, becoming managing director on the resignation of Sir George Gibb. As the number of undertakings associated with the Underground Company increased by processes of amalgamation or exchanges of shares, so the sphere of his work widened, until now he is managing director of the Metropolitan District Railway, the London Electric Railway, the Central London Railway, the City and South London Railway, the London General Omnibus Company, and the Associated Equipment Company. He is also a director of the London United Tramways and the London and Suburban Traction Company, which undertakings are also associated with the Underground Company. Sir Albert has played an important part in the consolidation of the various interests, and in the organisation of the vast scheme of passenger traffic facilities which these undertakings represent.

LONDON COUNTY COUNCIL TRAMWAYS.

A Deficit after Paying Interest and Sinking Fund Charges.

The accounts of the London County Council Tramways for the year ended March 31 show a deficit of £88,525. A report submitted by the Highways Committee states that on March 31 the total length of the tramway system was 148½ street-miles, including 8 miles of horse lines. During the year the income from the electric lines was £2,247,042 13s., and working expenses were £1,585,251 5s. 5d., leaving a surplus of £661,791 7s. 7d. On the horse lines the income was £21,625 10s. 8d., and expenses were £30,214 19s., a deficiency of £8,589 8s. 4d. The total income was £2,268,668 3s. 8d., expenses were £1,615,466 4s. 5d., a surplus of £653,201 19s. 3d. Interest absorbed £328,109 10s. and redemption £408,488 2s. 10d., and after deducting income tax (in addition to property tax included in working expenses), £28,196 18s. 8d., Parliamentary expenses, etc., £2,014 1s. 8d., and adding tax deducted and retained from interest on debt, £19,139 14s. 5d., interest on cash balances, etc., £1,443 12s. 5d., rents from surplus property, £2,097 5s. 6d., debt charges on moneys advanced to London United Tramways for reconstruction of tracks, £2,472 8s. 2d., there was a deficiency of £88,525 15s. 11d., which was met out of the general reserve fund. The Highways Committee attribute the deficiency mainly to motor omnibus competition.

JUBILEE OF THE BELFAST TRAMWAY MANAGER.

The Notable Record of Mr. Andrew Nance.

Mr. Andrew Nance, general manager of Belfast Corporation Tramways, last month reached the jubilee of his association with tramway work. His introduction to it was made as far back as June, 1864, when he became a pupil of Mr. R. Jacomb-Hood, of Little George Street, Westminster, who was the engineer for the Landport and Southsea Tramways, for which Parliamentary sanction was obtained in 1863, and which were constructed in the following year. Mr. Nance's duties included assistance in the preparation of the drawings, and when the construction stage was reached the making of measurements and the laying out of the work. Those were the pioneer days of tramways, and the lines in question were amongst the first to be laid in the streets of a British town. The rails used on that occasion were peculiar, and were secured to longitudinal sleepers by countersunk screws. At the time they were considered superior to the American step rail, but in 1870 they were replaced by the trough, which had a check rail. One of the first companies authorised to adopt that system was the

Mr. Andrew Nance.

Portsmouth Street Tramway Company which took over the Landport and Southsea concern and constructed several other lines. The Act relating to this was passed in 1870, and the tramways were at once constructed. Mr. Nance was one of the first directors of the Portsmouth Company, his name appearing in the Act of Parliament. In 1887 Mr. Nance assumed the management of the Belfast Street Tramways, which then employed horse traction. The company made great progress under his guidance, the annual receipts rising from £14,500 to £272,000, and good dividends were paid with unbroken regularity. When the transfer to municipal ownership came about 10 years ago—the concern being purchased for almost £400,000—Mr. Nance still retained the managership. The system was electrified, and the undertaking thus brought into modern conditions has continued to flourish. Mr. Nance is a warm advocate of the universal penny fare for Belfast, and when last his scheme in that connection was debated by the City Council it was rejected by a solitary vote. On the interesting occasion of his jubilee of tramway service the Belfast general manager received the cordial congratulations of his staff and of the citizens, whose good wishes will be joined in by those associated with tramway undertakings everywhere. There are few, if any, tramway officers who can point to such a long and successful career.

Damage to Track by Heavy Motor Vehicles.—Mr. W. Clough, general manager of Bury Corporation Tramways, states that much more money will have to be spent on the tramway paving owing to the damage which is now caused by heavy motor vehicles.

The Commercial Vehicle Committee.—Mr. Sidney Straker having retired from the chairmanship of the Commercial Vehicle Committee of the Society of Motor Manufacturers and Traders, Mr. Raymond Dennis has been elected to fill the vacancy. Mr. Straker has held the position for a number of years, and he has been accorded a vote of thanks for his services. Mr. Dennis is a member of the firm of Dennis Brothers, Limited, of Guildford.

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FINANCIAL REPORTS AND MEETINGS.

Provincial Tramways Company.—The directors announce an interim dividend of 8d., less tax, upon the £1 ordinary shares.

Manila Electric Railroad and Lighting Company.—A quarterly dividend of 1¾ per cent. ($1·75 per share) has been declared for the quarter ending June 30, on the common stock.

Melbourne Tramway and Omnibus Company.—A dividend of 6d. and a bonus of 6d. per share have been declared for the quarter ending June 30, and 10s. per share out of realised assets.

Lancaster Corporation Tramways.—The past year's trading showed a gross balance of £689. After paying interest and redemption the net deficit is £1,927, compared with a net deficit of £2,254 for the previous year.

Yorkshire (West Riding) Tramways.—An interim dividend of 3 per cent. (being at rate of 6 per cent. per annum) has been declared on account of dividend accrued on the 6 per cent. cumulative preference shares, payable July 1.

The Dundee, Broughty Ferry, and District Tramways Company have offered to sell to the Dundee Council a portion of the company's line between the city boundary and Belsize Road for £15,485. The Council's offer is £8,500.

Merthyr Electric Traction and Lighting Company.—The report for 1913 gives a surplus of £4,888, after setting aside £3,000 for renewals, and £929 was brought forward. A dividend on the ordinary shares of 7 per cent. is proposed, placing £1,000 to reserve and carrying £660 forward.

Brazilian Traction, Light, and Power Company.—The accounts for the 18 months ended December 31 show, after paying five dividends on common shares of 1¼ per cent. each, a surplus carried to profit and loss of $3,012,997. The surpluses of the company and subsidiary undertakings amounted to $15,028,144.

York Corporation Tramways.—Mr. J. W. Hame, tramways manager of York, in his annual report says that all previous records have been broken. The net surplus on the year's work, after meeting interest and sinking fund charges, amounts to £2,523. The receipts amounted to £26,775, or 9·08d. per car-mile, an increase of 18·68 per cent. over the previous year.

R. Waygood and Company.—The report for the year ended March 31 shows that the profits, including £9,691 brought forward, amounted to £27,068. The sum of £1,000 is placed to reserve, and the directors recommend a further dividend at the rate of 7 per cent. per annum for the six months ended March 31, making 6 per cent. for the year, leaving £6,156 to carry forward.

Imperial Tramways Company.—The net revenue account for the year 1913 shows an available balance of £31,819, against £24,256, and after payment of interest on the debenture stock for the year there is an available amount of £19,107. It is proposed to pay a dividend for the year at 4 per cent. on the ordinary capital (less tax) and to carry forward £273 For 1912 the dividend was the same.

J. G. White and Company.—The report shows that the net profit for the year to February 28 last amounted to £70,387. A further £15,000 is allocated out of profits to the general reserve, making this reserve now £135,000. It is proposed to again recommend a dividend of 12 per cent. per annum on both classes of shares, and, in addition, an extra dividend of 10s. per share on the ordinary shares, leaving £21,786 to be carried forward.

Bombay Electric Supply and Tramways Company.—According to the report for the past year the net revenue increased by £16,800. After the transfer of £23,500, as against £22,000, to depreciation account, and £6,600, as against £6,500, to the sinking fund, and the appropriation of £8,000 for redemption of debentures, there was a net profit of £71,200, in comparison with £63,600 for 1912. The dividend on the ordinary shares, which was raised last year from 3 to 5 per cent., is further increased to 6 per cent. £4,300 is to be carried forward.

Burton Corporation Tramways.—This undertaking last year produced an income of £16,507, an increase of £820, the average traffic revenue per car-mile having risen from 7·09d. to 8·28d. Passengers increased from 3,188,655 to 3,339,184. The operating costs rose from 6·41d. to 6·58d. per car-mile. Gross revenue shows a surplus of income over expenditure of £3,847, compared with £3,352. The repayment of debt and interest charges amounted to £2,683, leaving a net surplus of £1,163. A sum of £1,500 provided out of the rates has been placed to the renewals fund, and of the above surplus £562 has been utilised to wipe out the suspense account, the balance, amounting to £602, being carried forward.

General Electric Company.—The report of the directors for the year ended March 31, 1914, states that the net trading profits and income from investments, etc., amount to £157,893, to which must be added balance brought forward £32,331, making a total available profit of £190,224. Debenture interest absorbs £8,000, and depreciation and provision for renewal expenses £24,328, and the directors recommend the following disposal of the available balance of £133,896: Managing director's and employees' bonus, £10,156; expenses of new issue of capital, since made, £14,000; dividend on ordinary shares at the rate of 10 per cent. for year, £40,000; reserve account, £30,000; conditional appropriation to staff benevolence, £3,000; carried forward, £36,740.

New General Traction Company, Limited.—The report for the year ended March 31, submitted to the 18th annual meeting which was held on June 8, stated that the revenue amounted to £21,753, and the profit to £12,484. Adding the sum of £4,497 brought forward, the directors recommended that £10,480 be appropriated to the payment of a 4 per cent. dividend, and the balance of £6,501 carried forward. From the Norwich Electric Tramways Company a dividend of 3 per cent. was received for the year: 1s. 1d. per share from Coventry Electric Tramways Company; and 7 per cent. on preference shares and 3¾ per cent. on ordinary shares from Douglas Southern Electric Tramways, Limited. The income received from the Philadelphia undertaking was £13,922.

Huddersfield Corporation Tramways.—This undertaking reports a net profit of £21,295 for the past year on an income of £116,320. The sum of £6,662 has been applied for the relief of the rates, and the balance placed to the reserve or renewal account, which now amounts to £30,973. The capital outlay to date is £458,878. The income per car-mile was 11·34d., and the total working expenditure 6·92d. per car-mile. Alderman Aston, chairman of the committee, said the relief of the rates would be to the extent of 3½d. in the £, thus paying back a further instalment of the money the ratepayers had had to find to subsidise the tramways from 1881 to 1895, and from 1902 to 1905. The amount so paid by the ratepayers amounted to £73,041. That had been reduced every year from and including 1906, and to-day the amount was £25,613.

Reading Corporation Tramways.—For the year 1913-14 the total revenue was £36,910, an increase of £2,447. Working expenses were £20,564, a decrease of £202, notwithstanding that the car-mileage increased from 915,180 to 941,303 miles The number of passengers was 8,865,128 (9·42 per car-mile), or 101 per head of the population, against 8,251,274 the previous year. The cost of generating energy has been further reduced from ·78d. to ·737d. per unit. The gross profit of £16,346 is £1,877 more than for the preceding year, and the net profit of £4,419 is £1,618 higher. Mr. G. F. Craven, the general manager and engineer, states that the balance in the reserve fund at March 31 was £15,841, and if the Council decide to put the whole of this year's net profit to the reserve fund the figure would then be £20,261, which is only 8·83 per cent. of the capital value of the undertaking. At a comparatively early date very extensive renewals to permanent way will be necessary.

Working of the Lorain System at Wolverhampton.—The Corporation tramways working for the past year resulted in a gross profit of £24,077. To this sum is added the balance of £365 on the motor chars-a-bancs account, making a total of £24,443. This has been disposed of as follows: Interest on capital (less interest received), £6,854; income tax on profits, £187; repayment of loans, £5,285; renewals account, £3,715; additions and improvements, £2,848; leaving a balance appropriated to borough rate, 1914-15, of £5,554. The sum of £54,864 now stands to the credit of the reserve and renewals fund. The revenue for the year on the electric traction constitutes a record for the undertaking, and may be accounted for principally through the good trade which has prevailed. The sum of £5,554, equal to 3½d. in the £, has been allocated in relief of the rates. The working cost per car-mile shows an increase, being 6·651d. against 6·272d. This is due largely to the assessment of the tramways having been increased from £2,500 to £5,294.

Progress at Bournemouth.—Mr. I. Bulfin has presented his annual report to the Tramways Committee, showing traffic receipts £104,969, an increase of £8,959, of which £5,713 was due to Sunday traffic. The receipts per car-mile were 12·83d. as against 12·24d. in the previous year. The working expenses, exclusive of capital charges, amount to £59,135, being at the rate of 7·23d. per car-mile, the working expenses being 56·33 per cent. of the receipts. This figure is slightly more than the previous year, due to the reduction in working hours of the staff, time and quarter for Sunday work, and increased cost of coal and other materials. The net profit was £13,107, and the committee recommend that £1,000 be placed to reserve and the balance to renewals. Councillor Davis, chairman of the committee, said that five years ago the undertaking showed a loss of £5,000. The change for the better was due to the manager and staff. Councillor Bell, ex-chairman, said that the burgesses who voted for Sunday running had also to be thanked for a great deal of the profit now earned.

Coventry Corporation Tramways.—The accounts of the Coventry Corporation Tramways, of which Mr. T. R. Whitehead is general manager and engineer, show a fairly satisfactory result, but considerable increase in expenditure for the year ended March 31, 1914, has more than balanced the increase in revenue. The chairman of the committee, Councillor M. K. Pridmore, observed that nothing had yet been allowed for track renewal, but that they would have to

(Continued on page 41.)

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

TABLE I.—TOWNS WITH COMBINED GENERATING STATION FOR TRACTION AND LIGHTING PURPOSES.

Name.	Year Ended.	Electric Traction Inaugurated.	System.	Line open (single track). Mls. Chs.	Borrowing Powers.	Borrowing Powers Exercised.	Unexhausted Borrowing Powers.	Total Capital Expenditure.	Capital Expenditure per Mile of Single Track.	Loans Outstanding.	Loans Repaid and Sinking Fund.	Depreciation, Renewal and Reserve Funds.	Gross Receipts. Traffic.	Other.	Total.
Aberdeen	May 31, 1913	Dec., 1899	E.	27 66	350,000	...	...	350,590	12,599	192,660	157,929	143,468	79,125	1,041	80,166
Accrington	*Mar. 31, 1914	Aug., 1907	,,	10 53	181,925	133,875	48,050	134,734	12,636	113,870	20,864	16,581	29,843	350	30,193
Ashton-u-Lyne	Mar. 25, 1913	Aug., 1902	,,	8 15	130,070	108,099	21,971	108,099	13,203	79,589	28,510	2,150	22,206	285	22,491
Ayr	May 15, 1913	Sept., 1901	,,	7 49	...	...	...	85,445	11,224	78,933	18,044	14,918	15,626	670	16,296
Birmingham	*Mar. 31, 1914	Jan., 1904	,,	114 44	2,577,611	2,352,104	225,507	2,334,437	20,379	1,913,559	438,545	186,154	628,016	7,455	635,471
Blackburn	*Mar. 25, 1914	Mar., 1899	,,	24 63	408,174	342,474	65,700	335,735	13,544	248,578	182,557	2,146	68,192	3,147	71,339
Blackpool	Mar. 31, 1913	June, 1899	,,	21 31	453,798	301,796	152,002	301,796	14,115	301,796	114,086	15,126	73,155	1,011	74,166
Bolton	*Mar. 31, 1914	Dec., 1899	,,	47 19	551,092	551,092	...	566,355	11,961	399,417	178,850	50,819	142,504	1,270	143,774
Bradford	Mar. 31, 1913	July, 1898	,,	(h)103 69	1,269,568	982,398	287,170	1,002,566	9,653	607,928	388,335	89,072	280,758	18,345	299,103
Brighton	Mar. 31, 1913	Nov., 1901	,,	17 15	358,620	279,000	80,715	277,914	16,170	223,556	55,653	6,708	51,780	2,018	53,798
Burnley	*Mar. 31, 1914	Dec., 1901	,,	22 18	388,052	325,999	62,053	232,501	10,461	179,136	64,381	39,684	88,050	266	88,316
Burton-on-Trent	*Mar. 31, 1914	Aug., 1903	,,	10 50	108,632	104,562	4,070	106,275	10,121	49,239	55,323	10,134	15,010	1,497	16,507
Bury	*Mar. 31, 1914	June, 1903	,,	21 2 (b)13 21	407,800	284,745	123,055	286,989	13,650	255,455	49,013	(l)29,518	69,745	335	70,080
Chester	Mar. 25, 1913	April, 1903	,,	6 35	92,991	82,380	10,611	82,934	12,883	69,727	12,785	2,968	12,272	458	12,730
Chesterfield	Mar. 31, 1913	Dec., 1904	,,	5 8	95,000	70,500	24,500	69,575	13,642	58,510	11,990	5,031	12,220	474	12,694
Colchester	*Mar. 31, 1914	July, 1904	,,	7 75	70,748	69,555	1,193	69,401	8,743	50,816	19,483	Nil.	10,390	509	10,899
Croydon	Mar. 31, 1913	June, 1906	,,	19 10	287,689	287,689	Nil	284,847	14,894	230,968	87,264	42,453	90,543	1,921	92,464
Darlington	Mar. 31, 1913	June, 1904	,,	8 71	107,500	76,263	31,237	76,322	8,587	56,888	19,434	5,726	11,842	334	12,176
Darwen	Mar. 31, 1913	Oct., 1900	,,	7 13	93,400	86,300	7,100	86,300	12,048	57,330	28,280	7,450	14,244	1,176	15,420
Derby	Mar. 31, 1913	July, 1904	E.	22 5	...	...	...	242,785	11,004	157,213	85,572	(a)4,486	E 46,820	1,030	47,850
			H.		...	...	...		...		...	...	H 394	22	416
Doncaster	Mar. 31, 1913	June, 1902	E.	12 42	...	...	..	99,172	7,918	80,400	14,741	780	19,928	334	20,262
Dundee	May 15, 1913	July, 1900	,,	27 38	(f)	345,450	...	352,663	12,835	262,038	83,411	71,823	63,395	1,650	65,045
East Ham	Mar. 31, 1913	June, 1901	,,	14 32	190,643	190,242	401	191,583	13,307	148,515	58,075	5,097	57,050	610	57,660
Exeter	Mar. 31, 1913	April, 1905	,,	7 0	106,000	86,111	19,889	86,111	12,301	69,376	17,209	5,915	16,748	Nil	16,748
Gloucester	Mar 31, 1913	April, 1904	,,	15 0	191,000	144,243	46,757	147,692	9,846	111,051	16,816	750	16,177	1,168	17,345
Halifax	Mar. 31, 1913	June, 1898	,,	54 70	449,263	412,876	36,387	414,246	7,549	299,480	105,948	27,379	104,947	1,026	105,973
Ilford	Mar. 31, 1913	Mar., 1903	,,	11 28	149,633	149,633	Nil	149,500	13,171	109,912	39,721	5,611	24,361	2,407	26,768
Ilkeston	Mar. 31, 1913	May, 1903	,,	3 60	64,214	47,000	17,214	47,883	12,769	42,500	13,660	Nil	6,006	58	6,064
Ipswich	*Mar. 31, 1914	Nov., 1903	,,	14 70	116,471	114,300	2,171	115,676	7,776	96,912	18,447	11,594	22,964	862	23,826
Keighley	Mar. 31, 1913	Oct., 1904	,,	6 9	50,934	47,328	3,606	47,328	7,745	32,468	16,961	942	8,845	313	9,158
Kilmarnock	May 15, 1913	Dec., 1904	,,	5 47	65,000	52,625	12,375	53,191	9,519	44,766	7,379	4,017	8,543	248	8,791
Kirkcaldy	May 15, 1913	Feb., 1903	,,	8 45	213,000	96,748	116,252	96,749	11,025	80,333	16,415	4,161	15,712	494	16,206
Lancaster	*Mar. 31, 1914	Jan., 1903	,,	4 65	...	45,700	...	43,684	9,077	30,450	15,350	3,074	5,779	158	5,937
Leith	May 15, 1913	Aug., 1905	,,	17 73	275,000	237,300	37,700	236,155	14,572	186,500	50,800	514	34,664	1,030	35,694
Leyton	Mar. 31, 1913	Dec., 1906	,,	18 40	306,427	306,371	56	295,376	15,966	249,165	48,876	3,445	68,809	1,558	70,367
Lincoln	*Mar. 31, 1914	Nov., 1905	S.	2 77	98,519	44,947	53,572	44,987	15,185	41,579	11,176	(a) 1,100	6,971	130	7,101
Liverpool	Dec. 31, 1913	Nov., 1898	E.	119 0	...	...	...	2,024,706	17,014	1,177,384	1,091,771	428,318	677,881	13,018	690,899
Lowestoft	Sep. 30, 1913	July, 1903	,,	4 6	96,230	89,912	6,318	89,912	22,064	76,283	15,251	...	11,365	296	11,661
Maidstone	Mar. 31, 1913	July, 1904	,,	7 3	82,932	82,582	350	79,098	11,239	67,191	15,391	Nil.	9,761	535	10,296
Manchester	*Mar. 31, 1914	June, 1901	,,	202 48	2,358,606	2,117,411	141,195	2,130,904	10,518	1,616,131	491,410	478,381	911,223	14,087	925,310
Nelson	Mar. 31, 1913	Feb., 1903	,,	3 69	38,000	37,832	168	37,832	9,795	30,118	7,714	...	10,240	51	10,291
Newport (Mon.)	Mar. 31, 1913	April, 1903	,,	14 28	219,250	196,250	23,000	193,191	13,463	164,763	31,487	9,095	37,555	995	38,550
Nottingham	Mar. 31, 1913	Jan., 1901	,,	37 40	730,300	725,945	4,355	638,005	17,479	426,818	217,041	64,242	161,746	2,404	167,160
Oldham	Mar. 25, 1913	May, 1902	,,	28 6 (b) 8 31	516,925	440,204	76,719	442,174	15,750	320,725	118,217	2,135	108,003	2,574	110,577
Perth	May 15, 1913	Nov., 1905	,,	6 60	90,000	78,350	11,650	78,629	11,649	63,340	15,489	1,673	8,761	509	9,270
Plymouth	Mar. 31, 1913	Sept., 1899	,,	15 0	...	189,512	...	219,417	14,628	90,925	37,826	17,550	37,925	1,123	39,048
Pontypridd	Mar. 31, 1913	Mar., 1905	,,	8 48	136,019	135,919	100	137,148	15,946	109,757	26,052	Nil	21,580	313	21,893
Rawtenstall	Mar. 31, 1913	May, 1909	,,	15 71	193,290	181,526	11,764	181,776	14,442	162,451	19,075	3,177	25,410	1,126	26,536
Rochdale	*Mar. 31, 1914	May, 1902	,,	(i) 40 2	356,991	347,782	9,209	353,066	16,020	347,782	95,573	11,000	82,878	798	83,176
Rotherham	Mar. 31, 1913	Jan., 1903	,,	12 2	...	...	...	162,504	13,542	144,850	27,250	21,203	40,232	26	40,258
			R.T	...	...	...	...	...	...	...	...	...	2,457	Nil	2,457
Salford	Mar. 31, 1913	Oct., 1901	E.	75 64	1,050,666	723,669	326,997	723,672	9,547	536,791	258,977	45,699	260,365	486	260,851
Southampton	Mar. 31, 1913	Jan., 1900	,,	18 35	276,755	252,164	24,591	255,154	13,974	170,637	79,732	12,595	64,186	2,348	66,534
Southend-on-Sea	Mar. 31, 1913	July, 1901	,,	11 49	130,000	129,961	39	143,808	12,384	116,940	12,784	3,045	31,453	465	31,918
Southport	Mar. 31 1913	July, 1900	,,	(d) 10 63	292,000	196,500	95,500	118,708	11,004	153,530	42,970	442	16,928	386	17,314
South Shields	*Mar. 31, 1914	Mar., 1906	,,	10 21	251,882	175,056	76,826	173,599	16,916	146,912	33,413	(l) 6,881	37,744	586	38,330
Stalybridge, H., M., D.	Mar 31, 1913	May, 1904	,,	27 57	325,270	274,990	44,280	279,778	10,096	224,700	56,290	500	34,961	677	35,638
Stockport	Mar. 31, 1913	Aug., 1901	,,	27 5	305,028	217,804	87,224	251,508	9,145	167,300	67,199	33,552	(n) 62,979	1,198	64,178
Sunderland	*Mar. 31, 1914	Aug., 1900	,,	20 28	308,699	303,211	5,488	305,493	15,012	172,370	121,850	39,508	74,861	365	75,226
Wallasey	Mar. 31, 1913	Mar., 1902	,,	19 69	198,167	195,290	2,877	215,424	10,846	167,924	58,733	11,927	57,458	564	58,022
Walsall	Dec. 31, 1913	Dec., 1902	,,	19 44	188,145	188,100	45	183,351	9,378	159,561	58,366	33,873	32,991	682	33,673
Walthamstow	Mar 31, 1913	June, 1905	,,	12 42	198,000	180,000	18,000	173,241	13,851	160,982	19,018	4,687	37,191	785	37,976
Warrington	*Mar. 31, 1914	April, 1902	,,	9 52	103,674	102,896	778	102,128	10,583	70,476	32,422	10,000	23,232	521	23,753
West Ham	Mar. 31, 1913	Feb., 1904	,,	30 4	563,478	551,463	12,015	556,878	18,532	539,650	90,402	40,352	137,766	676	138,442
Wigan	Mar. 31, 1913	April, 1901	,,	(k) 34 42	...	...	...	...	...	...	...	...	71,268	1,515	72,783
Wolverhampton	*Mar. 31, 1914	April, 1902	S.	21 40	279,733	268,185	11,548	287,569	13,378	215,166	61,351	54,864	56,444	759	57,203
Yarmouth (Gt.)	*Mar. 31, 1914	June, 1902	E.	14 58	149,600	124,750	24,850	126,363	9,207	116,450	25,996	9,075	25,712	527	26,239

TABLE II.—TOWNS WITH SEPARATE GENERATING STATIONS FOR TRACTION.

Belfast	*Mar. 31, 1914	Nov., 1905	E.	98 54	1,528,146	1,381,200	146,946	1,440,959	14,565	1,343,000	221,840	97,783	268,250	3,812	272,062
Bexley	Mar. 31, 1913	Oct., 1903	,,	6 42	99,942	97,387	2,555	96,927	14,912	76,492	20,895	959	13,654	(o) 1,542	15,196
Birkenhead	Mar. 31, 1913	Feb., 1901	,,	24 7	375,848	364,854	10,994	366,610	15,220	247,012	117,863	18,070	61,202	4,365	65,567
Bournemouth	Mar. 31, 1913	July, 1902	,,	(e) 29 62	449,027	...	...	435,788	19,500	221,797	134,815	13,733	95,695	317	96,012
Cardiff	Mar. 31, 1913	May, 1902	,,	31 66	818,573	787,292	19,564	783,270	24,612	542,488	244,803	92,968	129,265	21,361	150,626
Coventry	*Mar. 31, 1914	Jan., 1912	,,	15 61	251,014	235,574	15,440	229,197	14,541	230,596	8,517	3,983	42,751	733	43,484
Glasgow	*May 31, 1914	Oct., 1898	,,	193 40 (b) 2 53	3,714,266	3,694,143	20,123	3,675,317	19,023	2,517,360	1,176,783	2,136,808	1,078,691	5,156	1,083,847
Huddersfield	*Mar. 31, 1914	Feb., 1901	,,	48 41	772,662	407,142	365,520	458,878	9,460	239,984	176,542	30,974	112,660	3,660	116,320
Hull	Mar. 31, 1913	July, 1899	,,	30 44	677,673	541,871	135,802	542,371	17,753	527,641	147,925	125,407	157,048	1,393	158,441
Leeds	*Mar. 31, 1914	Aug., 1897	,,	114 5	1,701,455	1,626,422	75,033	1,571,196	14,384	1,286,916	534,631	4,801	423,516	3,939	427,455
Leicester	Dec. 31, 1913	May, 1904	,,	37 0	929,120	727,405	201,715	739,982	19,999	602,478	129,807	100,000	147,458	17,059	164,517
London	Mar. 31, 1913	...	H.	15 70	...	...	...	...	...	...	...	...	37,544	879	38,423
		May, 1903	C.E	272 40	(c)	(c)	(c)	12,268,095	...	11,734,060	2,515,747	906,796	2,143,559	69,748	2,213,307
N'castle-on-Tyne	Mar. 31, 1913	Dec., 1901	F.	61 0	1,522,010	1,251,047	270,963	1,234,080	20,230	939,120	383,921	119,407	228,091	10,114	238,205
Northampton	*Mar. 31, 1914	July, 1904	,,	9 16	239,800	127,255	112,545	126,431	13,742	87,022	40,501	11,834	28,527	812	29,339
Portsmouth	Mar 31, 1913	Sep., 1901	,,	30 66	662,280	698,319	...	712,792	23,118	647,489	234,258	94,934	108,087	1,745	109,832
Preston	Mar. 31, 1913	June, 1904	,,	17 16	224,102	187,270	36,832	187,269	10,888	119,790	42,091	36,841	42,964	306	43,270
Reading	Mar. 31, 1913	July, 1903	,,	13 14	235,000	234,000	1,000	229,372	17,409	169,642	59,896	17,831	32,984	1,030	34,014
Sheffield	Mar 25, 1913	Sep., 1899	,,	77 67	1,727,596	1,413,980	313,616	1,411,959	18,140	1,067,897	418,292	27,521	358,656	3,189	361,845
Wellington, N.Z.	Mar. 31, 1913	...	,,	30 7	496,423	496,423	Nil	606,771	20,165	496,423	39,486	109,066	149,446	826	150,272

C—Electric conduit system. F.—Electric trolley system. H—Horse lines RT—Railless trolley system. S—Surface contact system.
(a) Accident insurance fund. (b) Additional lines leased and worked. (c) Conferred by Annual Money Act, which limits amount for each financial year. Powers not exercised are lapsed (d) Not including 8 m. 78 ch. leased lines. (f) Unlimited. (h) Includes 1¼ miles railless trolley route. (i) 17 mi. 8 chn. single track leased. (k) Not including 10 miles 3 chains single track lines leased. (l) Including Insurance. (n) Includes £114 trackless cars. (o) Includes £1,310 through-running contributions.

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

Specially Compiled for "The Tramway and Railway World."

TABLE I.—TOWNS WITH COMBIHED GENERATING STATION FOR TRACTION AND LIGHTING PURPOSES.

Name.	Working Expenses.					Gross Profit on Working.	Additions to Gross Profit.	Deductions from Gross Profit.						Net Surplus + or Deficit −
	Traffic.	General.	Repairs & Maintenance.	Power.	Total.			Interest.	Sinking Fund.	Income Tax.	Depreciation & Renewal	Sundries.	Total.	
Aberdeen	20,710	9,404	5,954	7,138	43,206	36,960	472	6,839	4,661	...	13,407	...	24,907	+ 12,525
Accrington	7,570	2,792	2,268	4,880	17,510	12,683	...	3,969	3,783	198	3,100	65	11,115	+ 1,568
Ashton-und'r-Lyne	4,840	1,754	2,118	3,278	11,990	10,501	...	2,727	3,651	485	500	371	7,734	+ 2,767
Ayr	3,486	1,964	1,604	1,989	9,043	7,253	...	1,972	1,943	122	2,041	...	6,078	+ 1,175
Birmingham	183,119	59,947	88,698	113,743	445,507	189,964	8,487	68,478	53,804	...	...	197	122,479	+ 75,972
Blackburn	17,263	4,947	14,659	10,301	47,170	24,169	...	4,803	15,176	179	...	...	20,158	+ 4,011
Blackpool	15,992	5,132	9,286	9,272	39,682	34,484	...	(h) 9,184	6,969	...	8,000	...	24,153	+ 10,331
Bolton	30,721	9,423	16,898	20,151	77,193	66,581	995	(h) 11,230	17,387	1,239	18,357	1,446	49,659	+ 17,917
Bradford	83,763	24,458	46,061	46,271	200,553	98,550	4,045	20,735	31,926	3,653	32,921	4,360	93,595	+ 9,000
Brighton	14,309	4,028	12,853	8,316	39,506	14,292	27	7,800	5,560	...	27	...	13,360	+ 932
Burnley	23,284	7,571	11,998	20,096	62,949	25,367	...	6,939	7,728	1,072	...	(f) 1,941	17,680	+ 7,687
Burton-on-Trent	5,442	1,502	2,562	3,154	12,660	3,847	(t) 1,524	1,364	1,344	...	1,500	...	4,208	+ 1,163
Bury	15,735	5,416	7,011	7,684	35,846	34,234	151	7,904	4,895	462	3,124	(w) 12,000	28,385	+ 6,000
Chester	3,349	1,574	878	2,203	8,004	4,726	93	(h) 2,761	1,018	..	1,040	...	4,819	...
Chesterfield	2,739	1,230	1,912	2,110	7,991	4,703	253	2,287	1,849	...	...	...	4,136	+ 820
Colchester	2,783	1,286	2,177	2,566	8,812	2,087	67	2,081	2,406	...	...	...	4,487	− 2,333
Croydon	29,571	6,806	13,300	16,541	66,218	26,246	907	7,994	7,428	1,145	...	...	16,567	+ 10,586
Darlington	4,192	754	1,912	1,945	8,811	3,365	102	2,010	1,966	105	404	59	4,544	− 1,077
Darwen	3,594	831	3,096	2,395	9,916	5,504	141	2,298	2,191	...	1,050	...	5,539	+ 106
Derby	E 16,388 H 631	2,621 ...	4,768 73	8,200 ...	31,977 704	15,873 def. 288	547	6,388	3,363	...	310	(l) 300	10,361	+ 6,069
Doncaster	4,364	1,156	4,698	3,561	13,779	6,483	84	2,876	1,737	...	664	...	5,277	+ 1,290
Dundee	16,477	5,607	7,122	10,216	39,422	25,623	...	8,606	6,020	233	9,254	...	24,113	+ 1,510
East Ham	17,280	6,330	11,722	10,072	45,404	12,256	...	(h) 5,806	6,725	...	...	454	12,985	− 729
Exeter	4,511	1,175	1,311	3,499	10,496	6,252	...	(h) 2,347	1,814	48	...	...	4,209	+ 2,043
Gloucester	6,891	1,687	3,290	1,914	13,782	3,563	...	(h) 4,502	2,772	...	750	...	8,024	− 4,461
Halifax	27,116	8,306	15,263	18,976	69,661	36,312	51	10,159	10,562	...	6,701	1,760	29,182	+ 7,181
Ilford	9,482	2,424	4,116	4,279	20,301	6,467	557	4,894	4,146	...	...	...	9,040	− 2,016
Ilkeston	2,057	614	2,497	1,308	6,476	def. 412	524	1,748	1,694	..	...	(i) 412	3,854	− 3,330
Ipswich	8,538	2,250	5,578	3,522	19,888	3,938	...	(h) 3,624	2,142	...	...	...	5,766	− 1,828
Keighley	2,692	768	899	1,612	5,971	3,187	179	1,116	1,881	...	...	(m) 369	3,366	...
Kilmarnock	2,921	599	800	1,633	5,953	2,838	...	(h) 1,623	1,233	3	1,160	28	4,047	− 1,209
Kirkcaldy	4,728	1,158	1,525	2,636	10,047	6,159	...	2,660	1,608	...	410	110	4,788	+ 1,370
Lancaster	2,290	522	841	1,594	5,247	690	52	1,158	1,511	...	...	...	2,669	− 1,927
Leith	9,204	2,631	4,213	3,468	19,516	16,178	272	(h) 6,343	7,750	13	...	70	14,176	+ 2,274
Leyton	(p) 21,929	6,544	11,592	12,875	52,940	17,427	133	10,048	8,064	...	...	228	18,340	− 780
Lincoln	1,473	644	973	960	4,050	3,051	402	1,529	1,071	...	...	...	2,600	+ 853
Liverpool	180,226	61,361	84,026	121,185	446,798	244,101	24,220	48,971	60,318	...	(d) 54,163	(e) 4,869	168,321	+ 100,000
Lowestoft	3,320	743	1,579	2,685	8,327	3,334	..	(h) 2,499	2,031	...	...	...	4,530	− 1,196
Maidstone	2,405	1,018	1,469	1,903	6,795	3,501	58	2,687	2,243	...	...	32	4,962	− 1,403
Manchester	276,663	89,420	89,649	129,492	585,224	340,086	13,594	(h) 55,729	54,599	9,418	97,219	33,625	250,590	+ 103,090
Nelson	2,425	677	1,320	2,006	6,428	3,863	...	1,008	966	...	...	...	1,974	+ 1,899
Newport (Mon.)	10,254	4,009	10,364	7,044	31,671	6,879	808	5,817	4,197	...	...	...	10,014	− 2,327
Nottingham	43,601	15,142	18,684	30,847	108,274	58,886	...	14,349	19,762	...	...	...	34,111	+ 24,775
Oldham	25,759	7,792	18,416	21,470	73,437	37,140	1,474	15,796	11,822	1,099	...	(g) 7,762	36,479	+ 2,135
Perth	3,182	698	418	1,252	5,550	3,720	50	1,523	1,632	3	612	...	3,770	...
Plymouth	8,031	4,161	4,322	7,905	24,419	14,629	1,257	4,793	3,932	...	4,465	...	13,190	+ 2,696
Pontypridd	5,017	1,395	5,476	3,196	15,084	6,809	1,754	(h) 4,009	4,160	...	...	39	8,208	+ 358
Rawtenstall	5,415	2,133	3,445	4,113	15,106	11,430	(q) 1,612	5,947	6,113	...	...	...	12,060	+ 982
Rochdale	18,788	5,167	9,525	10,949	44,429	38,747	1,397	11,485	9,594	1,020	...	(z) 9,555	31,654	+ 8,490
Rotherham	E 9,212 RT 557	2,778 273	5,711 633	8,591 369	26,292 1,832	13,966 625	... ...	4,918 73	3,261 ...	... ...	5,037 ...	...	13,216 73	+ 750 + 552
Salford	73,745	17,785	22,183	47,371	161,084	99,767	5,659	(h) 18,749	21,912	2,522	12,867	27,376	83,426	+ 22,000
Southampton	19,408	5,269	10,092	12,280	47,049	19,485	9,151	7,290	7,241	565	5,000	1,422	21,518	+ 7,118
Southend-on-Sea	8,046	2,260	3,534	6,187	20,027	14,891	4,228	(h) 3,834	1,753	...	4,017	..	9,605	+ 9,514
Southport	4,428	2,140	2,662	3,263	12,493	4,821	6,362	6,513	5,017	...	1,977	628	14,135	− 2,952
South Shields	8,838	3,715	3,633	6,399	22,585	15,745	265	(h) 5,333	3,570	...	...	...	8,903	+ 7,107
Staly'dge, H., M., D.	12,148	4,018	6,273	6,445	28,884	6,754	...	(h) 7,711	7,308	...	327	532	15,878	− 9,124
Stockport	13,876	3,520	6,852	5,929	30,179	33,998	1,197	5,639	8,701	1,053	2,698	5,602	23,696	+ 11,500
Sunderland	19,609	5,294	6,482	11,276	42,661	32,565	259	(h) 6,837	9,948	637	10,002	400	27,824	+ 5,000
Wallasey	17,249	4,326	5,695	10,660	37,930	20,092	316	5,522	4,559	...	634	...	10,715	+ 9,693
Walsall	8,019	3,201	4,678	5,710	21,608	12,065	1,371	5,191	3,439	458	1,868	...	10,956	+ 2,480
Walthamstow	14,731	2,646	6,717	8,175	32,269	5,707	210	(h) 6,085	2,698	...	...	..	8,783	− 2,866
Warrington	5,999	1,834	3,973	3,411	15,217	8,536	537	2,481	3,353	...	...	...	5,834	+ 3,239
West Ham	51,254	11,253	26,921	19,386	106,814	29,628	508	19,511	12,369	685	...	959	33,524	− 3,388
Wigan	...	...	...	...	41,318	31,465	...	13,859	12,391	...	...	3,781	...	...
Wolverhampton	12,793	5,177	7,620	7,536	33,126	24,077	(x) 1,305	7,793	5,285	187	6,564	...	19,829	+ 5,553
Yarmouth (Gt.)	7,756	1,849	3,052	4,951	17,608	8,631	75	(h) 4,065	2,826	...	1,815	...	8,706	...

TABLE II.—TOWNS WITH SEPARATE GENERATING STATIONS FOR TRACTION.

Belfast	77,949	12,593	41,455	28,281	160,278	111,784	931	48,342	31,353	1,072	17,000	3,082	100,849	+ 11,866
Bexley	3,455	1,011	2,332	1,167	(s) 10,118	5,078	40	2,850	2,410	...	242	...	5,502	− 384
Birkenhead	16,099	4,011	10,380	9,371	39,861	25,706	86	(h) 11,537	9,501	269	4,302	183	25,792	...
Bournemouth	22,307	6,912	9,107	13,967	52,293	43,719	723	10,733	15,371	...	...	(e) 8,017	34,121	+ 10,321
Cardiff	37,582	(c) 11,176	15,351	20,184	84,293	66,333	1,732	24,138	22,801	800	6,946	...	54,685	+ 13,380
Coventry	12,861	4,471	7,945	3,839	29,116	14,368	478	8,506	5,230	...	277	414	14,427	+ 419
Glasgow	332,546	134,034	156,214	53,483	676,277	407,570	64,989	82,921	102,607	14,057	212,642	6,440	418,667	+ 53,892
Huddersfield	28,548	6,253	27,821	8,349	70,971	45,349	519	(h) 11,617	11,004	1,545	..	406	24,572	+ 21,296
Hull	47,495	12,212	42,005	11,245	112,957	45,484	1,500	16,730	12,201	1,500	(u) 3,118	...	33,549	+ 13,435
Leeds	113,819	41,144	41,020	30,399	226,382	201,073	8,354	44,961	53,914	5,344	31,576	3,627	139,422	+ 70,005
Leicester	54,257	10,405	21,566	23,887	110,115	54,402	3,763	23,541	12,453	2,122	7,636	2,413	48,165	+ 10,000
London	H 19,064 E 742,157	4,670 (r) 185,634	6,592 312,395	m) 22,122 220,042	52,448 1,460,228	def. 14,025 753,079	... 33,397	342,645	388,042	28,188	497	(l) 27,104	786,476	...
N'castle-on-Tyne	64,493	18,675	25,944	19,908	129,020	109,185	3,966	30,431	39,556	3,179	..	6,796	79,962	+ 33,189
Northampton	7,881	3,169	2,806	4,958	18,814	10,525	506	(h) 3,322	4,422	309	195	(b) 1,083	9,331	+ 1,700
Portsmouth	28,918	10,200	7,877	5,231	52,226	57,606	8,831	20,875	17,462	964	8,412	350	48,063	+ 18,374
Preston	10,781	4,592	6,263	2,429	24,065	19,205	...	3,933	4,891	..	3,649	1,358	13,831	+ 5,374
Reading	8,837	3,702	3,648	3,358	19,545	14,469	...	6,714	4,662	291	...	...	11,667	+ 2,802
Sheffield	113,235	22,312	43,656	28,487	207,690	154,155	3,057	35,616	40,663	3,786	30,187	213	110,465	+ 46,748
Wellington, N.Z.	56,296	7,242	21,330	16,260	101,128	49,144	2,664	19,961	4,778	...	14,068	4,702	43,509	+ 8,299

(b) Includes £311 loss on omnibus account. (c) Includes £1,611 insurance fund. (d) Includes reserve. (e) Includes rents for leased lines.
(f) Rent of leased lines. (g) Includes rents of lines and deficit 1912. (h) Including income tax. (i) Loss on working. (k) Includes rents of lines.
(l) Including loss on horse traction. (m) Horsing expenses. (n) Transferred to motor omnibus capital account. (p) Includes £396 horse account.
(q) Aid from rates £1,500. (r) Including special charges, £5,911. (s) Includes £2,153 through-running contributions to L.C.C.
(t) (u) District fund widening streets. (w) Amount apportioned to leased lines.
(x) Includes £365 profit on motor char-a-banc. (z) Includes £6,519 rent of leased lines. ; £2,950 profit from 3 months' working.

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

Specially Compiled for "The Tramway and Railway World."

TABLE I.—TOWNS WITH COMBINED GENERATING STATION FOR TRACTION AND LIGHTING PURPOSES.

Name.	Appropriation of Net Surplus.			Receipts per Car Mile.		Operating Expenses per Car Mile.					Percentage of Operating Expenses to Total Revenue.	Average Operating Expenses per Car Mile (excludi'g Power Cost).	Board of Trade Units.		
	Carried Forward.	Reserve.	Contribution to Rates or Municip'l Funds.	Average Total per Car Mile.	Average Traffic per Car Mile.	Traffic.	General.	Repairs and Maintenance.	Power. (Price paid)	Total.			Units.	Cost per Unit.	Units used per car mile.
				d.	d.	d.	d.	d.	d.	d.	%	d.		d.	
Aberdeen ...	...	12,525	...	11·06	10·92	2·859	1·298	·822	·985	5·964	53·89	4·979	2,110,964	·81	1·21
Accrington ...	...	...	1,568	12·64	12·49	3·17	1·18	·94	2·04	7·33	57·99	5·29	949,054	1·23	1·65
Ashton-u-Lyne ...	...	...	1,000	11·682	11·534	2·514	·911	1·100	1·703	6·228	53·31	4·525	622,183	1·25	1·346
Ayr...	...	1,175	...	10·13	9·713	2·16	1·23	·99	1·24	5·62	55	4·35	378,570	1·26	·98
Birmingham ...	...	31,000	44,972	10·689	10·564	3·080	1·009	1·492	1·913	7·494	70	5·581	24,257,823	1·125	1·70
Blackburn ...	4,011	...	...	14·08	13·46	3·41	·97	2·93	2·06	9·37	66·10	7·37	1,901,668	1·3	1·64
Blackpool ...	...	2,667	7,664	16·93	16·71	3·64	1·17	2·12	2·12	9·05	53·50	6·95	1,400,209	1·587	1·33
Bolton	417	...	17,500	11·944	11·838	2·552	·782	1·404	1·674	6·412	53·064	4·664	4,396,543	1·1	1·52
Bradford	...	...	9,000	12·021	11·314	3·366	·983	1·859	1·860	8·068	67·051	5·687	11,126,989	1	1·863
Brighton	932	...	...	11·545	11·112	3·071	·864	2·758	1·785	8·478	73·43	6·693	1,663,126	1·2	1·49
Burnley	...	...	7,687	12·079	12·043	3·185	1·035	1·640	2·749	8·609	71·37	5·86	3,894,011	1·24	2·22
Burton-on-Trent	1,163	...	...	9·02	8·28	2·97	·82	1·40	1·72	6·91	76·7	5·08	545,672	1·39	1·08
Bury	...	(k)1,000	5,000	10·38	10·26	2·315	·769	1·213	1·252	5·549	50·44	4·297	2,037,620	1	1·252
Chester	...	...	...	8·81	8·50	2·32	1·09	·61	1·52	5·54	63	4·02	385,132	1·33	1·11
Chesterfield ...	...	820	...	10·51	10·12	2·27	1·02	1·58	1·75	6·62	62·9	4·87	405,096	1·25	1·39
Colchester ...	...	...	...	8·058	7·682	2·058	·95	1·61	1·897	6·515	80·36	4·618	410,555	1·5	1·26
Croydon	...	7,586	3,000	8·381	8·207	2·763	·637	1·224	1·499	6·123	70·91	4·497	2,484,993	1·604	·938
Darlington ...	...	...	...	7·651	7·441	2·633	·480	1·202	1·222	5·537	72·36	4·315	466,784	1	1·222
Darwen	106	...	...	14·218	14·204	3·771	·783	2·833	2·396	9·783	64·30	7·387	...	...	...
Derby	6,059	...	...	E 9·884 H. 5·649	9·671 5·347	3·385 8·564	·541 ...	·985 ·994	1·694 ...	6·605 9·558	66·8 169·4	4·911 ...	1,357,232 ...	1·45 ...	1·168 ...
Doncaster ...	...	1,290	...	9·41	9·25	2·03	·54	2·18	1·65	6·40	69·1	4·75	683,651	1·25	1·32
Dundee	...	10	1,500	11·480	11·189	2·908	·989	1·257	1·803	6·957	60·6	5·154	2,451,897	1	1·803
East Ham ...	. .	...	...	10·06	9·95	3·02	1·10	2·04	1·76	7·92	78·8	6·16	2,139,401	1·125	1·55
Exeter	...	2,043	...	9·272	9·272	2·498	·650	·726	1·937	5·811	62·67	3·874	516,793	1·625	1·192
Gloucester ...	...	...	...	6·618	6·173	2·630	·644	1·255	·730	5·259	79	4·529	480,442	1	·73
Halifax	...	...	7,181	11·816	11·702	3·023	·926	1·702	2·116	7·767	65	5·65	3,900,902	1·125	1·81
Ilford	...	...	...	7·616	7·464	2·698	·689	1·171	1·218	5·776	76·4	4·558	960,866	1·07	1·098
Ilkeston	...	...	...	6·727	6·661	2·281	·681	2·77	1·451	7·183	106·79	5·732	326,198	1	1·50
Ipswich	...	...	...	8·552	8·242	3·065	·807	2·002	1·265	7·139	83·47	5·874	676,189	1·25	1·011
Keighley	...	...	...	9·064	8·754	2·664	·761	·890	1·595	5·910	65	4·315	254,636	1·5	1·05
Kilmarnock ...	...	...	...	7·09	6·89	2·357	·482	·646	1·317	4·802	66·3	3·487	313,550	1·25	1·06
Kirkcaldy ...	1,370	...	...	8·22	7·97	2·398	·587	·774	1·337	5·096	63·95	3·75	632,581	1	1·337
Lancaster ...	...	...	...	8·23	7·94	3·14	·71	1·16	2·19	7·20	88	5·02	225,094	1·7	1·29
Leith	2,274	...	...	9·07	8·81	2·34	·67	1·07	·88	4·96	54·67	4·08	899,191	·92	·95
Leyton	...	...	...	9·368	9·161	(c) 2·920	·871	1·543	1·714	7·048	75·092	5·374	2,911,345	1·037	1·615
Lincoln	853	...	...	10·36	10·17	2·15	·94	1·42	1·40	5·91	57	4·51	190,838	1·25	1·12
Liverpool ...	...	...	100,000	12·34	12·10	3·217	1·096	1·500	2·164	7·977	63·2	5·813	23,928,396	1·138	1·78
Lowestoft ...	...	...	...	8·5	8·3	2·50	·56	1·2	2·0	6·26	71·58	4·26	368,242	1·75	1·1
Maidstone ...	...	...	...	8·36	7·93	1·96	·82	1·19	1·55	5·52	69·58	3·97	365,309	1·25	1·236
Manchester ...	...	...	103,090	11·410	11·236	3·411	1·103	1·105	1·597	7·216	63·25	5·619	30,035,057	1·034	1·543
Nelson	1,889	...	...	12·29	12·23	2·89	·81	1·58	2·39	7·67	62	5·28	240,804	2	1·2
Newport (Mon.)...	...	...	...	9·557	9·310	2·542	·994	1·570	1·746	7·852	82·26	6·106	1,239,245	1·28	1·28
Nottingham ...	...	5,775	19,000	11·50	11·34	3·00	1·05	1·29	2·11	7·45	64·19	5·39	5,761,096	1·25	1·65
Oldham	...	2,135	...	12·946	12·645	3·016	·912	2·156	2·514	8·598	66·41	6·084	3,435,211	1·49	1·675
Perth	...	...	...	8·79	8·31	3·02	·66	·39	1·19	5·26	59	4·07	277,474	1·08	1·09
Plymouth ...	...	...	2,696	11·790	11·094	2·349	1·217	1·264	2·312	7·142	62·53	4·830	1,139,761	1·667	1·38
Pontypridd ...	355	...	...	12·16	11·99	2·78	·78	3·04	1·78	8·38	68·89	6·6	613,719	1·25	1·42
Rawtenstall ...	...	982	...	11·49	11·01	2·35	·92	1·49	1·78	6·54	56·69	4·76	734,781	1·38	1·33
Rochdale	8,490	...	...	11·163	11·123	2·520	·692	1·307	1·556	6·075	53·4	4·519	2,610,994	1·006	1·546
Rotherham ...	E. ... R.T 552	...	750 ...	12·50 10·36	12·50 10·36	2·86 2·35	·86 1·15	1·77 2·66	2·67 1·56	8·16 7·72	65·31 74·56	5·49 6·16	1,499,517 64,520	1·375 1·375	1·94 1·13
Salford	...	...	22,000	10·692	10·673	3·023	·729	·909	1·942	6·603	62	4·661	9,260,898	1·226	1·60
Southampton ...	7,118	...	...	10·411	10·044	3·037	·825	1·579	1·921	7·362	71	5·441	2,000,301	1·5	1·31
Southend-on-Sea	2,514	1,000	6,000	13·14	12·97	3·03	·85	1·33	2·33	7·54	57·35	5·21	848,538	1·75	1·33
Southport ...	...	...	...	9·595	9·381	2·454	1·186	1·475	1·808	6·923	72·1	5·101	513,285	1·5	1·185
South Shields ...	(d) 500	4,907	1,700	10·244	10·087	2·362	·993	·971	1·710	6·036	58·92	4·326	1,105,203	1·388	1·231
Stalybridge, &c.	...	...	...	7·880	7·729	2·686	·887	1·387	1·425	6·385	81·33	4·960	1,719,696	·9	1·584
Stockport ...	...	250	11,250	10·77	10·57	2·323	·592	1·152	·936	5·063	47·02	4·067	1,897,114	1·069	1·327
Sunderland ...	...	...	5,000	12·00	11·943	3·128	·844	1·034	1·799	6·805	56·97	5·0	1,804,219	1·5	1·19
Wallasey ...	...	2,500	7,500	11·035	10·928	3·280	·823	1·083	2·028	7·214	65·3	5·18	1,827,115	1·4	1·45
Walsall	1,480	...	1,000	11·234	11·007	2·675	1·068	1·561	1·905	7·209	64	5·304	845 654	1·68	1·176
Walthamstow ...	...	...	...	7·92	7·76	3·07	·55	1·40	1·71	6·73	84·97	5·02	1,426,964	1·375	1·24
Warrington ...	739	...	2,500	12·521	12·246	3·161	·966	2·096	1·798	8·021	68·273	6·223	545,817	1·5	1·199
West Ham ...	...	...	...	9·43	9·329	3·554	·761	1·823	1·313	7·451	78	6·038	6,103,884	·75	1·72
Wigan	...	...	...	12·05	11·80	...	...	...	...	6·84	56·77	5·09	2,132,384	...	1·471
Wolverhampton	...	...	5,553	11·485	11·333	2·569	1·039	1·530	1·513	6·651	57·9	5·138	1,845,821	1	1·542
Yarmouth (Gt.)...	...	...	...	8·738	8·563	2·583	·616	1·016	1·649	5·864	68·48	4·215	758,296	1·56	1·052

TABLE II.—TOWNS WITH SEPARATE GENERATING STATIONS FOR TRACTION.

									*					Works Cost.	
Belfast	...	...	11,866	9·51	9·38	2·72	·44	1·46	·99	5·61	58·91	4·62	11,000,708	·617	1·37
Bexley	...	..	...	13·77	12·37	3·19	·73	2·20	1·1	7·22	66·6	6·12	405,140	1·1	1·52
Birkenhead ...	...	...	...	12·075	11·89	3·128	·779	2·016	1·141	7·064	58·49	5·923	2,490,713	·565	2·016
Bournemouth ...	...	10,321	...	12·24	12·20	2·85	·88	1·16	(b) 1·78	6·67	54·46	4·89	2,917,309	·583	1·55
Cardiff	3,980	...	9,400	12·014	11·83	3·449	1·026	1·409	·679	6·563	56	5·884	4,015,405	·438	1·54
Coventry ...	419	...	...	9·271	9·115	2·742	·953	1·694	·819	6·208	66·9	5·389	1,652,029	·544	1·47
Glasgow	...	...	53,892	10·659	10·609	3·271	1·318	1·536	·526	6·651	62·69	6·125	33,685,570	·378	1·38
Huddersfield ...	6,662	14,634	...	11·34	10·98	2·78	·61	2 72	·81	6·92	61·01	6·00	4,881,338	·42	1·94
Hull	...	1,435	12,000	9·42	9·33	2·82	·68	2·46	·67	6·63	71·04	5·96	4,855,082	·67	1·31
Leeds	...	...	70,005	11·145	11·042	2·967	1·073	1·070	·792	5·902	52·96	5·110	17,175,710	·493	1·801
Leicester	...	...	10,000	9·801	8·785	3·232	·620	1·285	1·423	6·560	66	5·137	7,141,333	·411	1·77
London	...	...	...	H. 8·73 E. 10·04	8·53 9·73	4·32 3·36	1·07 ·84	1·50 1·42	5·02 1·00	11·91 6·62	136·50 65·97	11·91 5·62	... 138,714,732	... ·619	... 2·62
N'castle-on-Tyne	...	21,189	12,000	11·958	11·451	3·238	·937	1·302	1·000	6·477	52·57	5·477	9,426,563	·394	1·972
Northampton ...	...	1,200	500	10·69	10·39	2·87	1·15	1·03	1·80	6·85	64	5·05	966,282	1·23	1·47
Portsmouth ...	11,374	(f) 3,000	4,000	12·229	12·035	3·220	1·136	·877	·582	5·815	47·55	5·233	2,599,210	·543	1·206
Preston	...	5,374	...	10·698	10·50	2·665	1·135	1·550	·600	5·95	55·63	5·35	1,516,545	·384	1·309
Reading	...	2,802	...	8·920	8·650	2·319	·970	·957	·880	5·126	57	4·246	1,033,313	·78	·99
Sheffield	...	7,032	37,716	10·760	10·665	3·367	·664	1·298	·847	6·176	57·389	5·329	16,500,208	673	1·837
Wellington, N.Z.	8,299	...	...	15·654	15·568	5·864	·755	2·222	1·694	10·535	67·3	8·841	4,921,406	·80	2·13

* The figures given under "Power" in Table II. include actual works costs only. H—Horse lines. E—Electric trolley system. (b) Including ·88d. per car mile current supplied by Bournemouth and Poole Supply Company. (c) Horse account ·053d. (d) Accident, insurance, and compensation fund. (f) Insurance fund. (i) Including Insurance. (k) Insurance. (t) Amounts for 15 months.

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

Specially Compiled for "The Tramway and Railway World."

TABLE I.—TOWNS WITH COMBINED GENERATING STATION FOR TRACTION AND LIGHTING PURPOSES.

Name.	Population Served.	Traffic Records. Car Mileage.	Passengers Carried.	Passengers Carried per Car Mile.	Average Fare per Passenger. d	Average Journeys per Head of Populat'n per Annum.	Average Car Miles per Day per Car.	Traffic Revenue per Mile of Single Track. £	Average Traffic Revenue per Annum per Head of Populat'n Served.	Operating Expenses per Passenger. d.	Average Distance of 1d. Fare. Miles.	Average Fare Charged per Mile. d.	Average Speed per Hour. Miles.	Average Total Car Hours per Day.	Average Number of Cars in Use Daily.	Number of Cars in Stock.
Aberdeen ...	165,000	1,738,966	19,990,711	11·49	·95	121·15	105·8	2,930	9/6	·519	1·69	·6	7·5	655	45	77
Accrington...	45,525	373,536	4,998,979	8·72	1·377	109·8	...	3,033	13/1	·84	...	...	...	...	..	27
Ashton-u-L.	50,000	462,060	4,928,282	10·666	1·081	98·565	105	2,712	8/10	·584	1·223	·81	8	190	12	23
Ayr	33,000	385,986	3,880,850	10·05	·96	117	106	2,079	9·6	·558	1·25	·75	8	140	10	20
Birmingham	868,430	14,268,244	146,930,986	10·29	1·03	169	79·77	5,482	14 5	·904	2·	·427	7·87	10·16	500	550
Blackburn ...	200,000	1,149,462	12,731,532	11·07	1·28	63·15	105	2,751	6/10	·88	1·25	·76	7·5	448	32	61
Blackpool ...	67,500	1,060,115	12,452,820	12	1·41	184·48	89·6	4,321	21,8	·765	...	...	8	...	32	72
Bolton ...	221,000	2,888,930	32,019,574	11·08	1·062	144·88	122·85	3,032	13/-	·578	1·553	·635	7·25	1,030	73	112
Bradford ...	354,000	5,971,561	62,005,976	10·383	1·086	175	113	2,703	15/11	·776	1·63	·804	7·3	2,232	144	242
Brighton ...	132,265	1,118,309	11,312,855	10	1·09	85·55	82·83	3,012	7/11	·84	1·27	·788	6·41	544	34	50
Burnley ...	175,000	1,754,811	17,668,834	10·07	1·18	101	120	3,971	10/1	·85	1·25	·83	7	874	46	67
Burton ...	48,000	439,248	3,339,184	7·60	1·058	70	...	1,782	6/3	·91	1·505	·58	7·5	...	...	20
Bury	128,202	1,631,126	15,831,487	10	1·06	123·5	98·80	2,028	10/10	·543	1·24	·85	8·51	483·83	45·26	54
Chester ...	39,028	346,645	3,067,815	8·85	·96	78·6	95	1,906	6/4	·626	1·27	·8	7	150·60	10·04	18
Chesterfield	38,000	289,745	2,631,398	9·08	1·1	69	122	2,407	6/8	·728	1·38	·75	7·33	126	7	14
Colchester ...	44,700	324,622	1,757,784	6·58	1·42	47·84	89·6	1,309	4/8	1·20	·85	·96	6·75	142·27	9·88	18
Croydon ...	170,451	2,657,824	20,504,143	7·74	1·06	120·29	125	4,734	10.7	·775	2·15	·50	7·92	915·82	58	75
Darlington...	58,000	381,920	3,791,835	9·9	·75	65·38	95·1	1,345	4/1	·557	1·219	·45	6·66	151·25	11	16
Darwen ...	40,611	252,710	2,755,011	10·91	1·24	67·83	...	1,989	7/-	·864	...	...	...	...	...	...
Derby ...	124,000	E 1,161,864 H. 17,674	10,857,834 98,230	9·345 5·558	1·035 ·962	87·56	...	2,122 ...	7/7 ...	·707 1·36	1·44 1	·75 1	6·375 ..	...	...	50 3
Doncaster ...	52,000	516,540	5,072,172	9·81	·952	97·54	103	1,591	7/8	·652	1·25	·76	7·5	218	16	25
Dundee ...	165,000	1,359,821	17,734,162	13·04	·857	107	...	2,305	7/8	·533	2	·50	7·3	...	...	68
East Ham ...	130,000	1,375,433	17,775,698	12·92	·77	132	...	5,101	8/9	·61	1·60	·65	...	...	...	45
Exeter ...	48,660	433,507	4,110,513	9·48	·98	84·48	...	2,392	6/11	·612	1	1	6	...	16	20
Gloucester ...	53,972	628,946	4,200,432	6·7	·92	77	90·75	1,078	6/-	·78	1·5	·65	6·75	260·3	19	30
Halifax ...	176,000	2,152,391	19,456,923	9·04	1·27	110	79·5	1,912	11/11	·86	1·35	·84	6·5	814	74	95
Ilford ...	82,000	843,817	7,578,813	8·79	·831	92·42	...	2,312	5/1	·64	1·543	·69	8	...	..	26
Ilkeston ...	32,000	216,348	1,404,447	6·49	1·26	43·9	95	1,604	3/9	1·106	1·50	·633	7	93	7	13
Ipswich ...	75,681	668,650	5,715,035	8·54	·975	75·51	65·5	1,559	6/1	·84	1·53	·693	5·51	332·80	20·80	36
Keighley ...	43,000	242,500	3,099,272	12·8	·68	72·08	55·35	1,447	4/1	·462	2·22	·45	6·87	126	7	12
Kilmarnock	36,000	297,557	2,317,709	7·78	·879	64·38	90·05	1,537	4/8	·616	1·13	·86	7·22	112·58	9·05	14
Kirkcaldy ...	39,600	473,089	5,237,947	11·07	·719	132·27	59	1,786	7/11	·46	1·522	·64	7·5	195	15	22
Lancaster ...	41,786	174,752	1,603,321	9·17	·865	38·37	76	1,204	2/9	·785	1·71	·5	8	87·22	6·23	12
Leith ...	110,400	944,329	9,706,611	10·28	·87	87·92	125	1,926	6/3	·482	1·33	·72	8·3	311	20·66	37
Leyton ...	124,735	1,802,647	17,476,453	9·69	·945	140	112	3,719	11/-	·727	...	...	8	...	...	60
Lincoln ...	20,000	164,499	1,826,885	11·11	·907	91·34	65·7	2,350	6/11	·532	1·75	·428	7	90	5	8
Liverpool ...	839,000	13,442,605	144,085,927	10·72	1·129	172	77	5,695	16/2	·744	2·514	·39	7·5	4,920	480	595
Lowestoft ...	35,000	313,341	2,613,797	8	1·04	70	72	2,788	6/6	·764	1·5	·7	5·75	192	12	19
Maidstone ...	25,000	295,438	2,224,200	7·528	1·053	88·968	81	1,387	7/1	·73	1	1	6·7	128	12	19
Manchester	945,280	19,463,646	205,608,741	11	1·06	218	94·7	5,054	19.3	·683	...	...	...	...	...	662
Nelson ...	45,000	200,996	2,776,785	13·82	·88	61·71	94·09	2,650	4,4	·555	1	1	5·50	108	6	11
Newport ...	87,626	968,067	9,251,181	9·56	·973	105·6	...	2,617	8/7	·821	1·75	...	...	...	37	44
Nottingham	260,000	3,485,789	38,484,032	11·04	1·02	148	92·08	4,514	12/8	·67	1·68	·65	6·86	...	104	135
Oldham ...	180,000	2,049,916	21,435,727	10·457	1·19	119·087	109·5	2,962	12/-	·822	1·113	·884	6·84	820	51·25	92
Perth... ...	35,900	252,940	1,813,228	7·16	1·15	50·5	96·25	1,298	4/7	·73	...	...	6·25	120	8	12
Plymouth ...	112,000	820,406	8,839,974	10·77	1·029	78·92	...	2,528	6/9	·663	...	...	...	...	...	42
Pontypridd...	40,000	432,006	5,047,168	11·68	1·02	126	81·2	2,509	10/9	·71	1·25	·51	6·5	221	17	26
Rawtenstall	50,000	553,813	4,949,775	8·93	1·23	98·72	126	1,600	10/2	·73	1·12	·88	9	198	12	24
Rochdale ...	130,000	1,778,030	14,584,777	8·16	1·36	112·2	114·90	2,079	12/9	·731	1·07	·90	7·66	660	44	69
Rotherham...	64,000	E 772,610 RT 56,887	8,774,539 191,088	11·35 3·36	1·104 3·08	137·12	...	3,352	12/7	·719 2·3	...	...	...	...	...	...
Salford ...	350,000	5,854,830	50,113,120	8·559	1·243	143	111	3,425	14/10	·771	1·85	·55	7·853	2,075·18	144	200
Southampt'n	122,200	1,533,638	12,475,793	8·134	1·235	102	...	3,482	10 6	·90	...	...	...	...	...	70
Southend ...	78,000	637,366	7,581,104	11·89	1·09	97·2	87	4,708	8/10	·634	1·41	·76	6·5	357	21	31
Southport ...	31,312	433,068	4,401,336	10·63	·923	140·5	103	1,574	10/10	·68	1·6	·62	6·65	217·5	13·5	26
So'th Shields	111,357	898,015	10,005,164	11·414	·905	90	110	3.677	6.9	·54	3·1	·38	8·06	338	20	35
Stalybridge	92,933	1,088,545	8,896,836	8·123	·943	95·7	...	1,280	7/6	·779	1·275	·784	6·8	...	...	60
Stockport ...	120,000	1,429,396	11,544,225	8·0	1·39	96·20	78·32	2,290	10 5·9	·627	1·3	·7	7·5	471	29	53
Sunderland	170,000	1,504,356	18,475,671	12·2	·972	108·6	78·4	3.679	8/9	·554	1·34	·68	7	688	43	70
Wallasey ...	83,000	1,261,858	12,352,000	9·78	1·11	148·94	98·7	2,893	13/10	·99	1·89	·54	7	...	...	61
Walsall ...	100,000	719,372	6,121,381	8·509	1·293	61	86	1.885	6/7	·847	1·24	·79	7	345	23	39
Walth'mst'w	128,000	1,151,029	11,807,549	10·258	·756	91·89	93	2,968	5/11	·655	1·15	·89	7·2	408	36	38
Warrington	86,000	455,304	6,134,545	13·473	·909	71·332	102·423	2,406	5/5	·59	1·246	·803	6·401	194·86	12·179	21
West Ham...	294,200	3,544,292	40,200,347	11·34	·822	136	98	4,592	9/4	·65	1·80	·56	7·66	1,262·25	99	118
Wigan ...	200,000	1,449,188	13,018,833	8·98	1·314	65·1	105·5	2,309	7/2	·761	1·15	...	7·4	...	42	67
Wolverh'ton	135,000	1,195,326	12,616,881	10·555	1·07	93·44	89	2,625	8/4	·631	1·25	·879	6·85	660·6	36·7	52
Yarmouth ...	56,000	720,702	4,930,728	6·84	1·231	88·05	79	1,746	9/2	·857	1·25	·76	7	375	25	35

TABLE II.—TOWNS WITH SEPARATE GENERATING STATIONS FOR TRACTION.

Belfast ...	390,000	6,865,591	63,131,820	9·19	1·02	162	128	2,703	13/9	·61	1·96	·43	8·75	2,350	257	289
Bexley ...	16,500	264,864	2,090,533	7·89	1·57	127	130	2,100	16/6½	1·16	1·59	·63	10	17	8	16
Birkenhead	130,832	1,235,277	13,622,361	11·02	1·077	104·12	68·64	2.540	9.4	·702	1·39	·66	6·61	511·73	49·30	59
Bournem'uth	120,000	1,882,054	15,750,576	8·36	1·45	131	95	3,214	16/-	·796	1·19	·87	6·80	1,140	60	81
Cardiff ...	182,729	2,614,901	28,365,277	10·84	1·09	155	98·25	4,062	14/1	·713	1·44	·736	7·5	1,120	70	130
Coventry ...	135,000	1,125,705	8,407,719	7·5	1·22	62	66	2,714	6·4	·831	1·18	·866	6·4	476	40	46
Glasgow ...	1,150,000	24,403,482	336,654,624	13·795	·769	292·74	106·18	5,499	18,9	·482	2·31	·44	8·13	8.815·65	623·69	851
Huddersfield	160,000	(a) 2,461,107	22,616,710	9·21	1·19	174	82	3,634	14/1	·766	1·35	·71	7·62	885·28	55·33	95
Hull	287,032	4,040,739	42,937,226	10·64	·877	149·80	127·10	5,141	10/7	·631	2·75	...	9	1,393·6	87·10	160
Leeds ...	525,000	9,204,331	93,679,774	10·17	1·081	178	115·41	3,694	16/2	(b) ·916	1·93	·539	7·56	3,339	222	318
Leicester ...	230,970	4,028,542	37,073,717	9·202	·954	161	...	3,985	12·9	·712	2·18	·984	8	...	...	150
London ...	...	H 1,056,481 E52,886,623	11,550,504 501,102,149	10·93 9·48	·78 1·03	...	77·12 117·15	2,365 7,867	... ..	1·09 ·69	...	...	5·85 8·82	500·84 16.427·36	38 1,237	74 1,661
Newcastle ...	300,000	4,780,662	52,204,974	10·92	1·082	174	...	3,738	15/2	·593	1·58	·633	7	...	...	192
Northampt'n	91,500	658,809	7,309,863	11·09	·94	82·73	..	3,102	6·4	·617	1·34	·7	...	...	...	26
Portsmouth	241,256	2,185,506	24,520,647	11·37	1·052	101·63	84	3,505	9/-	·511	1·66	·62	7	1,072	72	100
Preston ...	120,000	970,719	9,567,366	9·85	1·06	79·73	132	2,498	7·2	·603	1·01	·95	7·36	...	...	53
Reading ...	76,000	915,180	8,251,274	9·01	·97	108	97	2.505	8 8	·57	1·59	·68	7	352	26	36
Sheffield ...	466,408	8,071,188	96,350,242	11·935	·893	206·535	103·32	4,606	15 5	·517	2·62	·386	7·372	3,103·27	214·019	279
Wellington...	68,000	2,303,913	23,858,412	11·08	1·40	350	90	4,706	43/11	·94	1·112	·88	7·86	803	70	89

E—Electric trolley system. H—Horse lines. (a) Including 9,395 miles coal haulage. (b) Total expenses per passenger.

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expend a large amount in the near future. A summary of the accounts is as follows: Total receipts, £43,484; total working expenses, £29,116; balance carried to net revenue, £14,368; bank interest, £478; total, £14,846. Out of this the following charges have been met: Interest on capital, £8,506; contribution to sinking fund, £5,230; expenses raising funds, £414; balance carried to appropriation account, £696. The total length of the tramways is 13 miles. Other particulars are appended: Average expenses per car-mile, 9·271d.; average working expenses, 6·208d.; total car-miles, 1,125,705; total number of passengers carried, 8,407,719; number of units per car-mile, 1·47; works cost per unit, ·54d.; percentage of working expenses to receipts, 66·9; average revenue per mile of single track, £2,714.

Millars' Timber and Trading Company, Limited.—The 12th annual report, covering the year ended December 31 last, shows that the share capital remains at £1,700,000. Further amounts of debenture stock have been cancelled for the purpose of the sinking fund, and the amount now outstanding is £251,899. The balance of profit for 1913 is £181,669, and including £29,201 brought forward from 1912 there is a total amount available for distribution of £210,870. Debenture interest requires £21,664, and £50,000 has been carried to depreciation reserve account. Out of the balance the directors recommend a dividend of 6 per cent. on the ordinary shares, to be paid on September 30 next, amounting to £51,000, leaving £37,206 to be carried forward. The directors state that the export trade from Australia was on the whole satisfactory, but that trade conditions were less favourable to the company's business. The aerial cableway connecting the company's saw mill near Salonica with the railway is now practically finished. Large orders for timber have been received, and the first shipment will be made shortly. A timber and saw mill concession in Manila has recently been acquired, the concession including the right to cut timber over an area of 90,000 acres of forest, from which a large supply of valuable Philippine timbers will be obtained.

Birmingham District Power and Traction Company.—The directors' report shows that the revenue for 1913 was £126,416, compared with £115,698 for 1912, and the expenses amounted to £64,157, compared with £55,589. After adding £4,000 to the renewals fund and providing for the sums due to the local authorities, the surplus was £58,258, and £109 was brought forward. Debenture interest absorbed £26,889, and sinking fund charges £5,428. The balance permits a dividend of 3½ per cent. on the preferred ordinary shares, adding £2,000 to the reserve, and carrying forward £261. The report was adopted at the thirtieth general meeting, when Mr. C. S. B. Hilton, the chairman, said that although it had not been possible to recommend a distribution of profits beyond 3½ per cent. on the preferred ordinary shares, the shareholders had no reason to be dissatisfied with the position, or with the outlook. The receipts from the tramways showed an increase of £2,000, of which £400 was contributed by the parcels department, while running expenses had increased by £1,300, of which £760 was accounted for by increases in wages and salaries. Repairs and maintenance had increased by £1,100, mostly caused by additional expenditure on rolling stock. Negotiations were proceeding with Smethwick Corporation for improvements in the track, which, if carried out, would permit of better services on the main line and on the Bearwood Road line, which it was hoped would result in increased traffic. The whole of the electric lighting undertaking had been sold to the Shropshire, Worcestershire, and Staffordshire Electric Power Company.

British Electric Traction Company.—At the annual meeting of the British Electric Traction Company, held in London, on June 18, Mr. Emile Garcke, who presided, said that about 95 per cent. of their revenues of £225,000 was derived from companies associating in the British Electric Federation. The net revenue earned by all the federated companies, after paying all working expenses, amounted to £1,200,000 for the year. Of this about £800,000 was distributed in debenture interest and dividends on capital, and as much as £400,000 —about a third of the total net profits—was held in reserve in one form or another by the federated companies. The profits earned by the associated companies during the past year showed a substantial increase over those of the preceding year. Of the profits distributed for the past year by the federated companies in interest and dividends the B.E.T. Company received about £200,000. The remainder went to other debenture and stockholders in the federated companies. They had formulated for the consideration of the stockholders a scheme of reduction and rearrangement of capital, but while the scheme, if adopted, would immediately give the ordinary stockholders some return on their capital, it did not contemplate any sacrifice by the preference stockholders for which they were not adequately compensated. The directors proposed to submit the scheme to a few representative stockholders. With regard to the general prospects of the business in the immediate future, they believed that they would continue to make steady progress, notwithstanding that trade was waning and that wages and cost of materials had risen. They did not expect that they would find it necessary to reduce dividends.

Birmingham Corporation Tramways.—The accounts of the tramways department for the year ended March 31 last shows that the undertaking has again fully met the expectations of the Tramway Committee and of the public. The department is still in a stage of transition and expansion, and the conditions are consequently less favourable than they will be under normal circumstances. The summary of the revenue account is appended:

	£	Avg. per car-mile. d.
Traffic receipts	628,016	10·564
Other receipts	6,918	·116
Contributions for superannuation	536	·009
Total receipts	£635,470	10·689
Power expenses	113,743	1·913
Traffic expenses	183,119	3·080
General expenses	57,581	·969
General repairs and maintenance	88,699	1·492
Superannuation allowances	203	·003
Health and unemployment insurance	2,162	·036
Total expenditure	445,507	7·493
Balance carried to profit and loss account	189,963	
Add other items	8,488	
Total revenue	£198,451	

After paying interest on loans, £68,477, £53,804 to sinking fund for repayment of mortgages, £31,000 to reserve fund, and other items £197, there was a balance of £44,971. The statistical information included the following: Capital expenditure, £2,334,437; route-miles of track, 65 miles 46 chains; car-miles, 14,268,244; average number of miles per car per day, 79·77; average number of car-hours per day per car, 10·16; passengers carried, 146,930,986; percentage of working expenses to receipts, 70 per cent.; units per car-mile, 1·70.

Leeds Tramways.—Mr. J. B. Hamilton, in his report on the Leeds Corporation Tramways, gives the following summary of income and expenditure and the manner of application of the gross profit:

	£ 1913-14.	£ 1912-13.
Traffic revenue	425,516	407,552
Sundry revenue	3,939	3,979
Total	429,455	411,531
Working expenses	226,382	213,817
Gross profit	203,073	197,714
Against which is charged—		
Interest on capital	42,176	42,196
Less bank interest and dividends	8,354	7,511
	33,822	34,685
Income tax	5,344	5,020
Rental of Morley Light Railways	3,224	3,216
Sinking Fund	51,932	49,922
Permanent way renewals	31,576	41,752
Parliamentary costs and Sovereign Street estate	5,169	403
Revenue contribution to capital outlay	—	1,337
Total	131,067	136,335
Appropriated in relief of rates	72,006	61,379

The Corporation now own 109 miles of track; they lease from Morley Corporation 4·75 miles; and they have also a railless traction route of 3·75 miles. The energy consumption per car-mile, including transmission and conversion losses, was 1·776 units. The total coal consumption was 29,201 tons, and per unit generated 4·903 lb. The average traffic revenue per car mile was 11·042d., and average working expenses per car-mile (including power works cost) 5·902d., excluding power works cost 5·110d., and including total power cost and permanent way renewals 7·455d. Passengers carried aggregated 93,679,774, while the average fare paid per passenger was 1·081d.; total receipts per passenger, 1·095d.; total expenses per passenger, ·916d.; average net surplus per passenger, ·179d.; average number of passengers per car-mile, 10·17; average journeys per head of population per annum, 178; number of cars, 315. Since 1894 £912,198 has been transferred in relief of rates, and £534,630 has been set aside for sinking fund. The total capital outlay has been £1,571,196.

Manchester Tramways.—In their report to the Corporation on the working of the tramways during the year ended March 31 last the Tramways Committee state that 6 miles 318 yards of new lines were opened between May 9 and October 13, the aggregate length of single track now being 194 miles 969 yards, including the lines over which the Corporation exercise running powers. The revenue account for the past two years is summarised as follows:

	1913-14. £	1912-13. £
Traffic revenue	911,223	876,022
Other revenue	10,445	8,056
Parcels revenue	3,642	3,569
	£925,310	887,647
Working expenses	585,224	557,738
Balance—gross profit	340,086	329,909
Add bank, etc., interest	13,594	14,282
Available	353,680	344,191

(Continued on page 43.)

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TRAMWAY AND OMNIBUS SHARE LIST.

Specially Compiled for "The Tramway and Railway World."

Amount Ranking for Dividend.	Shares.	Name.	Div'd. Prev. Half-year.	Div'd. Last Half-year.	Quotations, July 2.	Movement Since June 2. Rise.	Movement Since June 2. Fall.	Latest Business Done. Price.	Latest Business Done. Date.	Yield on Buying Price. £ s. d.	Dividend Due. (Final in Italics.)	Quotations, Jan., 1908, to June 2, 1914. Highest	Quotations, Jan., 1908, to June 2, 1914. Lowest
$6,000,000	$100	Alabama Traction 5% Bonds	5	5	66–69	...	— 2½	67	May 19	7 5 0	Mar., Sept.	86	67
640,000	5	Anglo-Argentine Tramways 5½% Cum. 1st Pref.	2/9	2/9	4¼–4⅛xd	...	...	96 3	July 2	5 13 0	Jan., July.	5⅛	4¼
500,000	5	Do. do. 5½% Cum. 2nd Pref.	2 9	2 9	4¼–4⅛xd	...	...	86 3	July 2	6 2 3	*June, Dec.*	5⅛	4⅛
1,500,000£	...	Do. do. 5% Deb. Stock Red.	5%	5%	94⅛–96½	...	...	95⅜	July 2	5 3 9	June, Dec.	105½	94
325,532£	Stk.	Auckland Elec. Trys. Co. 5% Mort. Deb. ...	5%	5%	101–104xd	...	...	105½	May 6	4 16 3	Jan., July.	107	99½
75,000	1	Bath Electric Tramways 5% Cum. Pref. ...	6d.	6d.	9/16–11/16	...	...	10/6	Mar. 3	7 5 6	*Jan. & July*	11/16	9/16
334,696£	Stk.	Birmingham Dist. Pow. & Tract. 4½% 1st Deb....	4½%	4½%	82½–84½xd	...	...	86	Feb. 12	5 6 6	Jan., July.	96	77
15,000	10	Blackpool and Fleetwood Tramways	4/-	13/-	13½ -14	...	...	13⅜	June 29	6 1 6	Feb., Aug.	16	12
60,000	10	Bombay Elec. Supply & Trys. Co. 6% Cum. Pref.	6/-	6/-	11–11¾	+ ¼	...	11½	July 2	5 2 3	Feb., Aug.	12	7⅜
1,003,614	$100	Brazil Traction...	6%	6%	78–80	...	— 2½	79½	July 2	7 14 0	Fb.My.Ag.Nv.	105½	76⅝
75,000	5	Brisbane Elec. Tramways Investment Co. Ord.	4/-	4/-	6⅞–7⅜	...	...	7 1/16	June 18	5 8 6	*May*, Oct.	9½	5 1/16
75,000	5	Do. do. do. 5% Cum. Pref.	2/6	2/6	4¾–5¼	...	...	5 1/16	June 26	4 15 3	*May*, Nov.	5¼	4⅜
50,000	10	Bristol Tramways and Carriage Co.	4	5	5¾–6¼	...	— ⅞	5½	Oct. 29	7 4 0	*Feb.*, Aug.	14¼	5
50,000	10	Do. do. do. 4% Cum. Pref.	4	4	7⅛–7⅜	+ ⅛	...	6½	Nov. 21	5 5 0	Jan., July.	9¼	6¼
800,000£	Stk.	British Columbia Electric Railway Def. Ord. ..	8%	8%	107–111	...	— 3	107¼	July 1	7 4 3	May, Nov.	156	99½
800,000£	Stk.	Do. do. Pref. Ord.	6%	6%	103–107	...	...	103	July 1	5 15 0	Feb., Aug.	132⅛	99
800,000£	Stk	Do. do. 5% Cum. Perp. Pref.	5%	5%	105–108	+ 2	...	105	July 1	4 14 9	Jan., July.	114	98
1,070,097£	Stk.	British Electric Traction 6% Prefd. Ord. ...	...	...	13½–15½	...	— 1	14¾	June 30	...	Apr., *Oct.*	18	8
403,503£	Stk.	Do. do. 6% Cum. Pref. ...	6%	6%	85–89xd	...	...	87½	July 2	6 15 0	Feb., *Aug.*	95¼	73
1,464,245£	Stk.	Do. do. 5% Perp. Deb. ...	5%	5%	92–94	...	— ½	93½	July 2	5 7 6	April, Oct.	101	82½
439,796£	Stk.	Do. do. 4½% 2nd Deb. Red. ...	4½%	4½%	76–79	...	— 1	77¾	June 17	5 13 9	May, Nov.	84	58
246,625£	Stk.	Buenos Aires Port & City Trys. 6% 1st Mt. Deb.	6%	6%	73–78	...	...	71	Mar. 24	7 14 0	Feb., Aug.	103	61
623,270£	Stk.	Buenos Ayres Lacroze Trys. Stg. 5% 1st Mt Deb.	5%	5%	100–102	+ ½	...	100¾	June 27	4 19 0	Mar., Sept.	103	89
137,610	5	Calcutta Tramways Ord.	2/6	7/-	6½–7	...	...	6⅞	July 2	6 15 9	*Apr.*, Oct.	7⅜	4
47,295	5	Do. 5% Cum. Pref.	2/6	2/6	4¼–5xd	...	...	5⅛	May 23	5 0 0	Jan., July	5⅜	4⅜
491,222	1	Cape Electric Tramways	1/-	for yr.	⅜–¾	...	...	13/3	June 8	6 13 6	Feb., Nov.	1/2	3/8
15,000	10	Carthagena and Herrerias Steam Tramways ...	1/-	May, '13	2½–3½	...	...	62/6	Mar. 3	5 14 3	April.	7	2½
248,000	5	City of Buenos Ayres Tramways (1904) ...	2/6	2/6	5¼–5½	+ 1/16	...	5 5/16	June 20	4 11 0	Fe My Au No	6	5⅜
120,000£	Stk.	Colombo Elec. Trys. & Ltg. 5% 1st Mt. Deb. ...	5%	5%	91–95	+ 1	...	90	Jan. 7	5 6 0	May, Nov.	101	87
11,500	10	Cork Electric Tramways and Lighting Co. ...	...	6/- ann.	4–4½	...	...	4 1/2	Dec. 23	6 13 6	*Mar.*	10	4
12,327	10	Do. do. do. 5% Cum Pref.	5/-	5/-	6½–6¾xd	...	...	6⅝	July 2	7 8 3	Jan., July	10½	6½
3,000	10	Dublin and Lucan Elec. Railway 5% Cum. Pref.	5/-	Nil	6–7	...	...	9	Aug. 25/10	...	Sep.15 Mar.15	9¼	6
60,000	10	Dublin United Tramways Co. (1896), Ltd., Ord.	6/-	5/-	10⅜–11	...	...	10⅛	June 26	5 0 0	Feb., Aug.	14	10¼
60,000	10	Do. do. do. 6% Cum. Pref.	6/-	6/-	11⅛–12⅛	...	— 1/16	12½	June 26	4 18 0	*Feb.*, Aug.	14	11½
268,235	10/-	Hastings and District Elec. Trys Ord.	...	...	1/2–9/16	...	...	1/3	April 17	...	...	1/16	1/16
80,000	1	Do. do. 6% Cum. Pref. ...	6%	6%	½–11/16	...	...	10/9	April 17	8 14 6	...	¾	1/2
125,000£	Stk.	Do. do. 4½% Deb. Stk. Red.	4½	4½	65–70	...	...	65	April 15	6 8 9	April, Oct.	100	65
$9,634,000	$1,000	Havana Elec. Rly. Co. Con. Mort. 5%	5%	5%	95½–97½	...	...	96¼	June 19	5 7 6	Feb., Aug	105	80
195,000£	100	Hong Kong Tramways Co. 5% Mt. Deb. ...	5%	5%	83½–87½	...	...	86	June 10	6 5 9	May, Nov.	92	75½
20,000	10	Imperial Tramways Ord.	Nil	4% year	3–3½	...	...	3	Mar. 4	11 8 9	Feb., Aug.	9⅜	2½
20,000	10	Do. 6% Cum. Pref.	...	6% year	6½–6¾	...	...	6 7/2	Ju. 28/09	8 18 0	Jan., July.	9½	2½
30,000	5	Isle of Thanet Elec. Try. & Ltg. Co. 5% Cum. Pref.	3/-	Dec. '13	2–2½	...	...	45/-	May 15	6 0 0	*Mar.*, Sept.	3	0⅞
170,000	1	La Plata Elec. Trys. Co. 6% Cum. Pref. ..	0/4·80	0/7·20	13/16–7/8	...	...	17/-	Oct. 14	6 12 0	*April*, Oct.	1 1/16	0½
30,800	10	Lanarkshire Tramways	6/-	6/-	9½–10⅜	...	...	10⅜	May 28	6 0 6	Feb., Aug.	10 5/16	9⅜
250,000£	Stk.	Lancashire United Trys. 5% Prior Lien Deb....	5%	5%	84½–86½xd	...	...	87½	June 15	5 15 9	Jan., July.	95	76
634,026	1	Lisbon Electric Tramways Ord.	7½d.	7½d.	1⅛–1 1/16	...	...	25/-	June 30	4 11 6	*July.*	1 3/16	3/8
425,553	1	Do. do. 6% Cum. Pref ...	7½d.	7½d.	1⅛–1⅛xd	...	...	21/-	June 5	5 8 9	Jan., July.	1½	1/2
1,833,136	1	London and Suburban Traction Ord.	...	...	1/16–3/16	...	...	4,9	June 25	...	...	5/9	3/8
1,581,059	1	Do. do. do. 5% Cum. Pref.	5	5	½–⅝	...	— 1/16	11/-	June 26	8 0 0	Feb., Aug.	14/-	10 6
1,000,000£	Stk.	London General Omnibus 4½% 1st Deb.	4½	4½	99–101xd	...	...	101	July 1	4 9 0	Jan., July.	98½	92½
1,000,000£	Stk.	Do. do. 5% Cum. Income ...	5	5	88–91	...	...	88	July 2	5 11 9	Feb., Aug.	95	85½
1,649,930£	Stk.	London United Tramways 4% 1st Deb. Stk. ...	4	4	54–58xd	...	...	57	June 15	6 18 0	*Jan.*, July.	82	51½
63,430£	Stk.	Madras Elec. Trys. (1904) Ltd. 5% Deb. Red. ...	5%	5%	99–101xd	...	...	101½	Oct. 16	4 19 0	Jan., July.	105	86
20,000	5	Do. Do. Do. 6% Cum. Pref. ...	6%	6%	4⅞–5¼	...	...	5 1/16	June 13	5 14 3	Ma., Sept.	5⅜	87/6
300,000£	100	Manaos Trys. & Ltg. Co. 5% 1st Debs.	5%	5%	75½–78½xd	...	...	81	Feb. 20	6 7 6	Jan., July.	97	79
$4,785,000	$1,000	Manila Elec. R. R. and Ltg. Corp. 5% Gld. Bds.	5%	5%	98½–100½	...	...	100½	June 10	5 2 0	Mar., Sept.	104⅜	84
60,000	1	Mansfield & District Trys. Ltd. 6% Cum. Pref.	7½d.	7½d.	1/8–1 1/16	...	...	18/6	Sept. 24	5 13 0	Mar., Sept.	1 1/16	3/4
$20,000,000	$100	Mexico Tramways Common Stock	$13	Nov. '13	72–75	...	...	73	July 2	...	Fb.My.Au.No	151/4	59
$3,840,000	...	Michigan Untd Rys. Co. 5% 1st Debs & Refdg Bds	5%	5%	90–92	...	...	90½	June 29	5 7 0	May, Nov.	101½	89½
600,000£	100	Montreal Street Rly. 4½% Ster. Debs.	4½%	4½%	99–101	...	...	100½	June 26	4 9 6	Fe.My.Au.No.	107	97
150,000	1	National Steam Car	6%	year	1/16–1/8	...	— 1/32	13 6	June 17	8 4 6	Dec.	39/9	11/3
50,000	1	Oldham, Ashton, and Hyde Elec. Tramways Ord.	5	7	13/—14/-	...	...	7	Apr.2/13	8 11 6	Mar., Aug.	9⅜	5⅜
50,000	1	Do. do. do. 5% Cum. Pref.	5%	5%	13/—14/-	...	...	13/-	June 30	7 3 0	Feb., Aug.	8½	6 1/16
77,893	5	Para Elec. Rly. and Ltg. Co., Ord.	5/-	5/-	4–4½	+ ⅛	...	4 3/16	June 10	11 2 3	May, Nov.	8	4
245,000	1	Potteries Electric Traction Ord.	3½	for '13	3/16–5/16	...	...	7/6	May 6	8 12 6	April.	3/4	1/4
245,000	1	Do. do. 5% Cum. Pref. ...	6d.	6d.	1/2–5/8	...	...	12/3	June 5	7 12 6	*Feb.*, Aug.	1	1/16
124,560	1	Provincial Tramways Ord.	8d.	1/-	1/8–1/4xd	...	...	19/3	June 25	8 17 9	May, *Nov.*	1 1/16	13/-
10,000	10	Do. do. 6% Cum. Pref.	6/-	6/9½	10–10½xd	...	...	10 5/16	April 21	6 0 0	June, *Dec.*	11	9
50,000	5	Rangoon Elec. Trys. & Supply Co. 6% Cum. Pref.	3/-	3/-	4⅜–5⅜xd	...	...	5 1/16	May 8	5 11 9	June, Dec.	6	5
32,000	10	Shanghai Elec. Construction Co.	14/-	year	12½–13½	...	— ⅛	12¾	June 27	5 3 9	May.	13 1/8	6
330,400£	Stk.	Singapore Elec. Trys. Ltd., 5% Debs. Red. ...	5%	5%	88–92	...	...	89	April 2	5 8 9	Mar., Sept.	92	61
91,720£	Stk.	Southern Elec. Trys. of B.A., 1st Mt. Deb. ...	5%	5%	95–97	...	...	96¼	Mar. 3	5 3 3	Feb., Aug.	100⅜	90
471,500£	100	Toronto Rly. Co. 1st Mt. 4½% Stg. Bonds ...	4½%	4½%	97–99	...	...	98	May 7	4 11 6	Feb., Aug.	104	97
80,000	5	United Elec. Tramways of Monte Video, Ord....	3/-	4/-	4⅜–4⅝xd	...	...	98,9	May 19	7 11 6	*June*, Dec.	6½	4⅜
90,000	5	Do. do. do. 6% Cum. Pref.	3/-	3/-	4⅜–5⅛xd	...	...	4 1/8	June 19	5 14 3	June, Dec.	6⅜	4 1/16
500,000£	Stk.	Winnipeg Elec. Rly. Co. 4½% Perp. Cons. Debs.	4½%	4½%	93½–95½	...	...	94½	July 2	4 14 3	Apr., Oct.	109½	93½
40,977	5	Yorkshire (West Riding) Elec. Trys. Ord. ...	...	...	¼–½	...	...	6/-	June 3	...	*Mar.*	1½	3/8
46,261	5	Do. do. do. 6% Cum. Pref.	2/6	3/-	4–4½	...	...	85/7½	July 2	6 2 3	*Mar.*	4⅜	1½

ELECTRIC RAILWAY STOCKS.

1,854,720£	Stk.	Central London Ord. Stock (4% Guar.)	...	4	82–84	...	...	83	June 29	4 15 3	*Feb.*, Aug.	89⅛	59⅜
572,640£	Stk.	Do 4% Guar. Pref. Stock	4	4	84–86	...	...	85	May 11	4 13 0	Feb., Aug.	92	80
572,640£	Stk.	Do. Deferred Stock (4% Guar.) ...	...	4	80–82	...	...	80⅛	June 30	4 17 9	Feb., Aug.	91⅜	42
50,000	10	Liverpool Overhead Ord.	2/6	3/6	4⅛–4¾	+ ¼	...	4 1/16	June 9	6 6 6	*Feb.*, Aug.	4⅛	3/8
1,412,263£	Stk.	Mersey Cons. Ord. Stock	Nil	Nil	5⅛–6	...	— ¼	6	June 11	...	*Feb.*, Aug.	8	1
5,732,062£	Stk.	Metropolitan Cons.	1½	1½	39½–40½	+ ½	...	39⅛	July 1	4 0 9	*Feb.*, Aug.	75⅛	34
2,640,914£	Stk.	Do. Surplus Lands Stock	2½	2½	59–61	...	— 1	59½	June 29	4 10 3	*Feb.*, Aug.	72	58
3,235,000£	Stk.	Metropolitan District Ord.	Nil	Nil	24½–24¾	+ 1½	...	24⅜	June 30	...	*Feb.*, Aug.	51½	9½
500,000	10	Underground Electric Railways Co. of London ...	...	...	3⅛–3⅜	...	...	62/6	July 2	...	...	5 3/16	1⅜
1,730,000£	...	Do. 4½% Bonds of 1933	4½%	4½%	98–100xd	...	...	99¼	July 1	4 10 0	Jan., July	102	73
1,192,707£	...	Do. 6% 1st Income Debs.	6%	6%	115–117	...	...	116	July 1	5 3 6	Mar., Sept.	118	108
6,120,750£	Stk.	Do. 6% Income Bonds	60/-	60/-	90–91	...	— 1	90⅜	July 2	6 12 0	Mar., Sept.	97½	18
1,150,477	1/-	Do. "A" Ord.	...	...	7/16–½	...	...	9 4½	July 1	...	...	1/2	3/8

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Out of which the following charges have been met:

	1913-14. £	1912-13. £
Interest on mortgage debt	55,728	55,770
Redemption of debt	54,599	53,393
Contribution to street improvements—		
Interest and sinking fund	6,398	5,114
Rent, etc., of tramway	26,327	25,109
Leaseholds—proportion of outlay	899	837
Income tax	9,418	8,613
	£153,371	147,836

Leaving a balance, which has been appropriated as follows:

	1913-14. £	1912-13. £
Reserves, renewals, and depreciation account	97,219	96,351
In aid of the rates	103,090	100,000
	£200,309	196,351

In the revenue account the income and expenditure per car-mile are shown, together with the corresponding figures for the preceding year. These are shown in summarised form below:

	1913-14. d.	1912-13. d.	d.
Total revenue	11·410	11·351	increase ·059
Working expenses	7·216	7·132	increase ·084
Gross profit	4·194	4·219	decrease ·025

The main items of the working expenses are as follows:

	1913-14. d.	1912-13. d.	d.
Traffic expenses	3·411	3·269	increase ·142
General expenses	1·103	1·069	increase ·034
Repairs and maintenance	1·105	1·085	increase ·020
Power expenses	1·597	1·709	decrease ·112
	7·216	7·132	

The increase in the traffic expenses is accounted for by the increased scale of wages adopted for nearly all grades of labour chargeable to this account, and the accident in High Street caused the increase in general expenses under the head of compensation. The consumption of electrical energy decreased from 30,514,278 units to 30,035,057, and the units per car-mile from 1·625 to 1·543. During the year the scheme for the revision of fares and stages, provisionally adopted by the committee in December, 1912, and approved by the Council, has been put into operation. The effect of the change is shown in the large increase in the number of passengers carried; this increase during the year was 17,933,558. The number of passengers carried per car-mile has increased by 10 per cent., and the average number of journeys per head of population has risen from 201 to 218. The Corporation tramways now have a total track length of 136 miles, and 662 cars.

Glasgow Corporation Tramways.—Ranking as one of the largest and certainly as one of the most successful of municipal tramway systems, the Glasgow undertaking has for a long time been so prosperous that continual improvement each year upon the figures of the preceding one would seem difficult to attain. The results just now to hand for the year ending May 31, 1914, are, however, no exception to the established rule, but afford further evidence of progress in all desirable aspects. During the year capital expenditure on new work relating thereto has been more than met by realisation of surplus on unnecessary plant, etc., and the total capital expenditure now stands at £3,675,317, a reduction of £18,826 on the previous total. The total amount borrowed is £3,694,143, against which the sinking fund of £1,176,783 may be set, the addition to the latter for the past year being £102,607. The depreciation and renewals fund now stands at £2,196,808, as compared with £2,079,645 a year ago, and the general reserve fund is £38,069. Traffic receipts are considerably higher than in the previous year, being £1,078,691, or 10·609d. per mile, as compared with £1,007,653, an increase of over £70,000. Total receipts reach £1,083,846, equal to 10·659d. per mile. Passengers carried amount to 336,654,624, of which about two-thirds represent ½d. fares, and the mileage run 24,403 482, the passengers per mile being nearly 14. Rates and taxes paid for the year amount to £73,858, or nearly 5s. 5d. in the pound, practically double the proportion paid when the undertaking came into the hands of the Corporation. Working expenses reach a total of £676,277, equal to 6 651d. per mile, so that the balance carried to net revenue account is the substantial one of £407,569. The net surplus, after payment of rentals, interest on capital, contribution to sinking fund, income tax, and contribution to depreciation and renewals fund amounts to £53,892, and is handed over to the municipality to the credit of the Common Good.

The number of passengers carried during the year exceeded that for the previous year by over 25 millions. At each of the fares, ranging from ½ to 4d., the returns show an advance in the number of passengers, the increase in the case of the halfpenny fare being 19½ millions. The following are the details: Track length, 194⅛ miles; car-mileage, 24,403,482 (increase, 1,068,474); traffic receipts per car-mile, 10 609d. (decrease, ·245d.); traffic receipts per passenger, ·769d. (decrease, ·007d.); passengers carried, 336,654,624 (increase, 25,174,538); passengers carried per car-mile, 13,795; increase, ·447.

The following is a summary of revenue and expenditure for the year ended May 31, 1914, with comparative figures for the previous year:

	Year ended May 31, 1914 £	Year ended May 31, 1913 £	£
Revenue—			
Traffic receipts	1,078,691	1,007,653	+ 71,038
Sundry	5,156	3,891	+ 1,265
Total	1,083,847	1,011,544	+ 72,303
Expenditure—			
Traffic expenses	332,546	305,400	+ 27,146
General ,,	134,034	122,812	+ 11,222
Maintenance and repairs	156,214	142,988	+ 13,226
Power expenses	53,483	48,147	+ 5,336
	676,277	619,347	+ 56,930
Balance carried to net revenue account	407,570	392,197	+ 15,373
	1,083,847	1,011,544	+ 72,303
Net revenue account—			
Balance from revenue account	407,570	392,197	+ 15,373
Dumbarton Tramways	180	180	—
Interest on investments	64,809	58,451	+ 6,358
Total	472,559	450,828	+ 21,731
Appropriated as under—			
Rent of Govan lines	—	3,345	− 3,345
Rent of Paisley lines	5,830	5,499	+ 331
Interest on capital	82,921	81,774	+ 1,147
Sinking fund	102,607	97,077	+ 5,530
Income tax	14,057	13,388	+ 669
Parliamentary expenses	609	985	− 376
Renewal and depreciation	212,642	215,757	− 3,115
	418,666	417,825	+ 841
Surplus to be handed over to the Common Good	53,893	33,003	+ 20,889
	£472,559	450,828	+ 21,730

In the following table the number of passengers carried at each fare is given:

	Year to May 31, 1914.	Year to May 31, 1913		Year to May 31, 1914.	Year to May 31, 1913.
½d.	211,462,484	191,944,261	3d.	1,369,808	1,317,543
1d.	91,386,373	87,676,208	3½d.	1,141,967	1,076,768
1½d.	21,597,123	20,354,233	4d.	170,908	158,048
2d.	6,586 923	6,191,033			
2½d.	2,938,948	2,761,992	Total	336,654,624	311,480,089

Since 1902 the sum of £815,090 has been paid in relief of rates, £491,409 has been paid into the sinking fund (of which £489,903 has been applied in reduction of the loans), and £468,952 has been accumulated for renewals and depreciation. Running powers are being exercised over 14 miles of line outside the city. There are 662 cars, 494 being fitted with covered tops, 351 cars are single-truck and 266 double-truck.

TRAMWAY MANAGERS' CONFERENCE.

The managers' section of the Municipal Tramways Association met at Plymouth on Thursday and Friday, June 11 and 12, for the usual summer conference. The members were welcomed cordially by the Mayor, Mr. T. Baker, in the Council Chamber. The president of the Association, Alderman H. Linsley, Salford, replied, and the business of the meeting began with the discussion on two papers: "Description of the Plymouth Corporation Tramway System," by Mr. C. R. Everson (general manager of the Plymouth Tramways); and "The Cost of the Production of Electrical Energy for Traction Purposes," by Mr. J. F. Simpson (general manager, Preston Tramways). Subsequently a luncheon was given by the Mayor at the Royal Hotel. After lunch, Devonport Dockyard was inspected under official guidance, and the company then adjourned to a tea at the Royal Hotel, given by the Tramways Committee. At the Friday's session two papers were discussed: "Workmen's Return Tickets," by Mr. E. S Rayner (general manager, Doncaster tramways), and "Self-contained Electrically-equipped Vehicles," by Mr. L. E. Harvey (general manager, Ilford tramways). A hearty vote of thanks was accorded the Mayor (Mr. T. Baker) and Corporation, and the chairman (Mr. S. H. Phillips) and committee of Plymouth Corporation Tramways. At the lunch, which followed, given to the members by the Deputy-Mayor (Mr. S. H. Phillips, chairman of the Tramways Committee), the Mayor and town clerk (Mr. J. H. Ellis) also were present. The convention was closed with a trip to Colstock and the Weir Head in beautiful weather, and the members were, naturally delighted with their reception.

Among those present were: Messrs. R. L. Acland (Chesterfield), H. C. Bartlett (Exeter), J. Barnard (Bolton), W. Clough (Bury), G. F. Craven (Reading), J. Dalrymple (Glasgow), C. R. Everson (Plymouth), J. W. Falkingham (Bradford), A. R. Fearnley (Sheffield), F. Gottschalk (Northampton), J. B. Hamilton (Leeds), L. E. Harvey (Ilford), G. W. Holford (Salford), E. Holt (Ashton-under-Lyne) F. J. S. Hosken (Darwen), T. J. Kendrew (Southport), W. A. Luntley (Wolverhampton), C. W. Mallins (Liverpool), W. J. McCombe (Hull), J. M. McElroy (Manchester), J. Miles (Bolton) J. Moffett (West Ham), H. Mozley (Burnley), W. Murray (Walthamstow), J. E. Pearse (Northampton), H. Pilling (Accrington), E. S. Rayner (Doncaster), T. G. Richardson (Colne), W. Tuke Robson (South Shields), F. Schofield (Stalybridge), J. F. Simpson (Preston), A. B. Slater (Burton-on-Trent), C. J. Spencer (Bradford), hon. secretary of the Association, C. L. Stewart (Rawtenstall), H. Stokes (Bexley Heath), G. E. Webster (Rochdale), and R. Wilkinson (Huddersfield).

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PERSONAL.

Mr. F. H. Whysell, of Manchester Corporation electricity department, has been appointed electrical engineer to Greenock Council.

Mr. J. A. Panton has returned from a visit to Canada, and is prepared to accept an appointment in mechanical, electrical, or similar business.

Mr. G. F. Cornwallis-West, who in July, 1913, resigned his seat on the board of the British Electric Traction Company, has been re-appointed a director.

Mr. T. Hall, borough electrical engineer, Burton-on-Trent, has been voted an increase of £25 this year in his salary of £275, and an addition of £50 next year.

Mr. T. R. Whitehead, manager of the Coventry Corporation tramways, has been recommended by the Tramways Committee for an increase in salary from £450 to £500 per annum.

Mr. W. Dundas, a member of the Manchester Corporation electricity department's staff, has been appointed resident engineer at the Dickinson Street and Bloom Street generating station.

Mr. W. J. McCombe, manager, Hull Corporation Tramways, has been granted an increase in salary from £500 to £600, by a present instalment of £50 and increments of £25 in the two following years.

Mr. J. W. Thorpe, who has had over 13 years' experience as works foreman at Halifax, has been appointed works manager to Oldham Corporation Tramways. All of the eight applicants were interviewed.

Mr. C. B. Smith, chief engineer, Hove Electric Lighting Company, has been presented by the staff with a gold chronometer and a sovereign case on the occasion of the transfer of the undertaking to the Corporation.

Mr. Wm. Poole has been appointed assistant electrical engineer of the South Australian Government Railways. He was formerly with the New South Wales Government Railway department and also with the Adelaide Tramways Trust.

Sir George White, chairman of Bristol Tramways and Carriage Company, on June 5 returned to Bristol after a motor tour through France and Italy, upon which he set out immediately after the House of Lords' Committee had given their decision on the Corporation Bill.

Messrs. A. and F. Manuelle notify that they have removed to more convenient offices at Bishopsgate House, 80, Bishopsgate, E.C. Their telegraphic address will remain as at present, viz., "Feldspar, London," but their telephone number will in future be London Wall 8836.

Mr. E. Hamar, who has been appointed shift engineer at the Smethwick power-station of the Birmingham and Midland Tramways Joint Committee, has been presented with a silver rose bowl by the staff at the Frindsbury power-house of the Kent Electric Power Company, where Mr. Hamar has lately been engaged.

Mr. E. S. Pinkerton on June 3 was voted by Belfast Corporation an increase of his salary from £375 to £500 per annum for his duties in connection with the city surveyor's department and the supervision of the maintenance of the tramways permanent way. Two-fifths of the salary is to be paid by the Tramways Committee.

Mr. W. H. Taylor, formerly deputy electrical engineer at Walthamstow, has arrived in Perth, Western Australia, and taken up his duties as electrical superintendent of the tramways. The system is being extended under plans prepared by Messrs. Merz and McLellan, the extensions including a new power-station of 9,000 KW.

Sir Joseph Beecham, Kt., was one of the new Baronets announced in the King's birthday honours. He is a director of the South Lancashire Tramways Company, and for 15 years he has been chairman of the Electricity Committee of St. Helens Corporation. On eight occasions Sir Joseph has served as Mayor of the borough.

Sir J. F. C. Snell, president-elect of the Institute of Electrical Engineers, and Mr. W. J. Pratten, formerly engineering manager of Harland and Wolff, Limited, have been asked by Belfast Council to furnish a joint report on the condition of the plant at the Corporation electricity works, and the steps to be taken to extend the undertaking generally.

Mr. E. W. Browne has been appointed by Messrs. Bruce Peebles and Company, Limited, as their Birmingham manager in place of Mr. Hilton, who has resigned that position to take up other work. Mr. Browne has been connected with Messrs. Bruce Peebles and Company, Limited, for many years, and is thoroughly familiar with their manufactures.

Alderman Linsley, chairman of Salford Tramways Committee, and president of the Municipal Tramways Association, has presented a cup valued at 50 guineas, which was competed for in a five miles invitation cycle race at the sixth annual sports of the Salford tramway employees. The trophy will become the property of the competitor winning the race three times.

Mr. A. S. Parsons, engineering assistant to Mr. H. E. Stilgoe, the Birmingham city engineer, on May 23 read a paper on "Recent Highway Bridges in Birmingham," at a meeting of the West Midland District of the Institution of Municipal Engineers, held in that city. During 14 years' service Mr. Parsons has been engaged on tramway construction to the value of £250,000, the construction of 11 bridges, an 8,000-KW. generating station, and many other undertakings.

Sir George White, speaking at the annual meeting of the Imperial Tramways Company on June 26, said, "The day has gone by when the owners of tramways can hope to meet the public requirements by means of tramcars alone, and our experience in Bristol shows that, notwithstanding the smaller carrying capacity of the motor-'bus, the receipts per mile for the whole of last year in city and country regular services alike actually equalled the receipts per mile of the tramcars."

Tramways Congress at Budapest.—The following have been appointed delegates from Glasgow and Leeds Corporations to the Congress of the International Tramways and Light Railways Union which, as already announced, will be held at Budapest from September 7 to 12. Glasgow: Bailie Robert Kirkland, convener of the Tramways Committee; and Mr. James Dalrymple, general manager. Leeds: Mr. Alderman Smithson, chairman; Mr. Alderman Brown, deputy chairman; and Mr. J. Hamilton, general manager.

Sir John Williams Benn, who has just been created a Baronet, is the leader of the Progressive party in the London County Council. He has long taken an active part in London municipal affairs, having been a member of the County Council since its creation in 1889. He was chairman in 1904, and for a considerable time he was chairman of the Highways Committee. During this period he was associated with much of the committee's work in connection with the conversion of the horse tramways to electric traction. Sir John was created a Knight in 1906.

Mr. E. G. Mawbey, borough and tramway engineer, Leicester, was on May 26, on the recommendation of the Tramways Committee, voted an honorarium of £500 out of the tramway revenue for special services in connection with tramway construction, the erection of buildings, and the maintenance of permanent way during the last 12 years. Alderman Flint observed that the track construction entailed a great deal of work on Mr. Mawbey, who carried on the work at a cost of £17,000 less than the Parliamentary estimate for the contract price. The capital expenditure was something like £550,000. Mr. Mawbey's salary is £1,250.

Sir John Francis Claverton Snell, who has been created a Knight, has been a partner of the firm of Messrs. Preece, Cardew, and Snell, consulting engineers, since 1910, and he is president-elect of the Institution of Electrical Engineers. Born some 45 years ago, he made a distinguished mark for himself as borough electrical engineer for Sunderland. He was responsible for the extension of Dunning Street power-station from a capacity of 750 H.P. to 5,000 H.P., and also for the design and construction of Hylton Road Station, which will eventually provide 20,000 H.P. Leaving Sunderland in 1906, he began consulting practice in Westminster, and carried out advisory work in connection with certain London County Council electric supply schemes, as well as with electric railway projects. In the arbitration proceedings in regard to the purchase by the Post Office of the undertaking of the National Telephone Company, Sir John was the principal witness for the Post Office. Prior to his prolonged appearance in the witness chair, he had taken a leading part in preparing the Government's case in the arbitration—a work of great complexity and detail. In his present position he is partly engaged in heavy power work, but he devotes himself largely to acting as an expert consultant, especially to municipalities. It will be remembered that recently he was one of the experts who reported to Bristol Corporation in regard to the question of the purchase of the tramway undertaking of the Bristol Tramway and Carriage Company. Sir John was recently elected a member of the Royal Institution.

Mr. A. Bruce Anderson, who was one of the passengers who perished at the sinking of the "Empress of Ireland," was managing director of Ferranti, Limited, a director of Bruce Peebles and Company, Limited, chairman of the British Electrical and Allied Manufacturers' Association, and a member of the Council of the Institution of Electrical Engineers. Mr. Anderson joined the business of Mr. S. Z. de Ferranti in 1892, as an accountant, at the age of 22.—At an extraordinary meeting of the Council of the British Electrical and Allied Manufacturers' Association, held at 36, Kingsway, on June 8, a resolution was passed deploring the untimely death of the late chairman. The Council also placed on record not only their loss of the chief executive officer of the Association, through whose efforts mainly it has reached its present position, but also the loss of a personal friend. A copy of the resolution was sent to Mrs. Anderson, with an expression of the Council's deepest sympathy for her.

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CONTRACTS AND ORDERS.

The Titan Trackwork Company, Limited, have received an order from Warrington Corporation.

The British Thomson-Houston Company have an order from Gravesend for switchboard extensions.

Ramsbottom District Council have ordered two railless electric vehicles from the R.E.T. Construction Company.

Ferranti, Limited, have obtained an order from Wallasey Council for transformers at the new generating station, at £1,304.

Aylesbury Council have provisionally accepted the tender by Willans and Robinson for Diesel engines and plant at £4,753.

The United Electric Car Company, Limited, have a contract from Huddersfield Town Council for top-deck covers for 14 cars.

Belfast Corporation have accepted the tender of the British Westinghouse Company at £2,003 for a 1,000-KW. rotary converter.

Hadfields, Limited, have received a contract for the supply of special trackwork required in the relaying of tramways in Bolton.

Edgar Allen and Company, Limited, have a contract from Southend-on-Sea Town Council for work for the curve in Southchurch Avenue.

Sunderland Town Council have given orders to Ferranti, Limited, for transformers and meters, and to Siemens Brothers Dynamo Works for meters.

Trailer Cars for London.—The London County Council have ordered 150 trailer cars from the Brush Electrical and Engineering Company.

Brimsdown Lamp Works, Limited, have secured an order from the Great Northern Railway Company for the supply of metallic filament lamps.

West Ham Tramways Committee have recommended the acceptance of the tender of John Baker and Company to supply 32 in. and 22 in. tramway tires.

Babcox and Wilcox, Limited, have been allotted a contract for the complete equipment of the new boiler house at Edmonton (Canada) electricity works.

A.E.G. Electrical Company, of Johannesburg, have received a contract for the erection and equipment of a power-station from Heidelberg Council.

Ilford Council have placed contracts with Mawdsley's, Limited, for a battery booster, and with Messrs. Pritchetts and Gold for storage batteries at a sub-station.

Huddersfield Tramways Committee has accepted the tender of the British Insulated and Helsby Cables, Limited, for one mile of 00 hard-drawn round copper trolley wire.

York Council have accepted the tender of the General Cable Manufacturing Company, Limited, for the supply of high and low-tension cable, at £6,357, plus £50 for an extra duct.

Messrs. J. Williamson and Company's tender for the supply during 1914-15 of cast-iron plough shares has been accepted by the London County Council. The expenditure is estimated at £350.

Salford Corporation has accepted the tender of the British Westinghouse Company for a 5,000-KW. turbo-alternator at £14,137, together with their tender for an auxiliary turbine air pump at £769 14s.

British Insulated and Helsby Cables have obtained an order for feeder cables between the power-station and sub-station in connection with the electrification of the Melbourne Tramways at a price which is reported to be £259,000.

Sheffield Council have been recommended to accept the tender of Ruston-Procter and Company, Limited, for electricity generating plant driven by suction gas engines, the General Electric Company to be accepted as sub-contractors.

Colne Council have decided to proceed with the rebuilding of the whole of the tramcars, to fit them with vestibule fronts, and to place top covers on six cars. A new car is to be purchased, and repairs are to be made to the permanent way.

West Ham Council and Car Tenders. After considering tenders received for the supply of 16 new tramcars the Tramways Committee have directed the manager to "make inquiries in other directions with a view to obtaining more favourable prices."

W. T. Henley's Telegraph Works, Company, Limited, were the successful tenderers for the supply of cable and jointing to Walthamstow Urban District Council. The order for the stoneware conduits goes to the Albion Clay Company, Limited.

Dundee Council have accepted the tender of Hurst, Nelson, and Company for car bodies with vestibule ends; of the United Electric Car Company for trucks, including electro-mechanical track brakes; and of Dick, Kerr and Company, for electrical equipments.

Walthamstow Council have placed contracts as follow: Babcock and Wilcox, Limited, an additional boiler, overhead bunkers, and conveying plant, at £2,589, and the supply and fixing of pipe work, at £385; the New Conveyor Company, Limited, installing conveyors and ash bunkers, at £3,825.

Elwell-Parker Trucks.—The latest railway to join the numerous users of "Elwell-Parker" trucks is the Lancashire and Yorkshire Railway, who have just placed an order with the Railway Track Supply Company (of Great Britain), 79½, Gracechurch Street, E.C., for one of these trucks of the warehouse type.

Electric Motor Tower Wagon for Derby.—Edison Electric Company, Limited, have received an order from Derby Council for a motor tower wagon for the tramways department, at £680. A contract for the supply of switchboard instruments has been awarded to the British Thomson-Houston Company, at £328.

Hull Council have awarded contracts as appended: Brush Electrical Engineering Company, Limited, 20 car bodies; M. and G. Truck Engineering Company, Limited, 20 trucks; Siemens Brothers Dynamo Works, Limited, 20 pairs of motors for ordinary series parallel and 20 pairs of controllers.

The British Westinghouse Electric and Manufacturing Company, Limited, have secured a contract to supply the extra high-tension switch gear and also the low-tension switch gear for 11 sub-stations in connection with the electrification of the London and North Western Railway Company's suburban lines.

Huddersfield Council have placed contracts as appended: Switch gear for controlling the motor converters at the tramway power-station, Bruce Peebles and Company, Limited; switchboard for tramway supply, Ferguson, Pailin, and Company; steam pipes, John Spencer, Limited; cable, Geipel and Company and B.I. and Helsby Cables, Limited.

Warrington Council have placed the following contracts: Walter Scott, Limited, 100 tons steel tramway rails, £7 10s. per ton; Johnson and Phillips, Limited, transformers; Electric Construction Company, Limited, direct-current motors; British Thomson-Houston Company, Limited, alternating-current motors; Johnson and Phillips, Limited, cables.

British Cables for the United States.—British Insulated and Helsby Cables, Limited, have received an order from the Edison Electric Illuminating Company, of Boston, for 55,000 ft. of three-phase, 25,000-volt cable. The *Canadian Engineer* states that this is the first order for British cable for the United States, and it is also to be laid under the supervision of the British company.

British Rails for Sunderland.—The Tramways Committee received five tenders for the supply of 50 tons of rails. These were from two British firms, two German, and one American. The lowest tender was that of a German firm. The committee decided to recommend the Council to accept the tender of the North Eastern Steel Company, Middlesbrough, which was the next lowest.

Trailer Fittings for York Cars.—The Tramways Committee have placed a contract with the Brush Electrical Engineering Company, Limited, for the supply and fixing of coupling bars at each end of eight cars, the provision of attachments for coupling the light and bell signals for communicating between the motor car and trailer and making the necessary alterations to the existing cars, at £27 10s. per car.

Siemens Brothers Dynamo Works, Limited, have a contract from the Royal Mail Steam Packet Company for the supply of Tantalum lamps for ship lighting and for Wotan lamps for office lighting. The same firm during the Whitsuntide recess received an order from the Highways Committee of the London County Council for the repair of motor generators at Lewisham sub-station.

Manchester Tramways Committee have accepted the tender by Chambers, Scott, and Company, Limited, for a rail-bending machine, and the Electricity Committee have accepted the tender by Ferguson, Pailin, and Company for a low-tension switchboard at Stuart Street station, and by the British Insulated and Helsby Cables, W. T. Glover and Company, and Johnson and Phillips for cables.

Glasgow Tramways Committee have accepted tenders as subjoined: Rails and fish plates for Govan depot, Barrow Hæmatite Steel Company, Limited; rubber-insulated cable, W. T. Henley's Telegraph Company, Limited; three-core lead-covered cable, single-core lead-covered cable, J. Hally Craig; double-lead sheathed telephone and test cables, e.h.t. rubber-insulated cables, B.I. and Helsby Cables, Limited.

London County Council received the following tenders for the supply of wood-working machinery required for the third section of the central car repair depot:

	£ s. d.
W. B. Haigh, Gruban, and Co., Ltd. (accepted)	1,372 10 0
Do do. (alternative) (not to specification)	1,335 0 0
Buck and Hickman, Ltd.	1,485 12 6
Do. (alternative)	1,540 17 6
John Pickles and Son	1,531 10 0
Thomas Robinson and Son, Ltd.	incomplete tender
Wadkin and Co.	do.
A. Ransome and Co., Ltd.	do.

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TRAMWAY AND LIGHT RAILWAY NOTES.

ABERDEEN.

RATES OF PAY—RUNNING POWERS OF CORPORATION LINES.

In response to applications from employees, Aberdeen Tramways Committee have agreed to recommend to the Town Council that motormen, conductors, and all men working in the sheds on Sundays should be paid at the rate of time and a half, and that car cleaners should be divided into two classes, the first class to receive an increase of wages of ½d. an hour. A peculiar circumstance under the new arrangement is that first-year motormen and conductors will get ½d. an hour less for Sunday work than hitherto. There has been a uniform rate of 8d. per hour for Sunday work for all motormen and conductors. As first-year men receive only 5d. an hour on week-days, they will now get 7½d. on Sundays instead of 8d.—The Council on June 1 decided to renew the agreement permitting the Suburban Tramways Company's cars to run over the Corporation's system. Councillor Smith, chairman of the Tramways Committee, announced that the committee had been approached by the company with the object of either coming to an agreement in regard to the working of the undertaking, or to acquire the suburban tramways by purchase.

ACCRINGTON.

AUTOMATIC POINT CONTROLLERS—BROKEN AXLES.

On the Accrington Corporation tramways a third automatic point controller was installed during last year, the first two having proved a success. During the year 24 broken axles were replaced with forged axles of a special nickel steel. At the time of replacement the diameters were increased from 4 in. to 4¾ in., and the manager hopes that a much longer life will be obtained from them, "but," he adds, "sight must not be lost of the fact that the condition of the permanent way was such as to put a severe strain upon car axles."

BELFAST.

COUNTING OF CONDUCTORS' RECEIPTS LATE AT NIGHT.

In compliance with a promise made by the chairman of Belfast Tramways Committee, the general manager has by ballot ascertained the opinion of the conductors of over one year's standing upon the following question: Do you wish to wait when you come into the depot, after you have finished duty for the day, while your money is counted, compared with your waybill and tickets, and a receipt given for it? The result was that 216 conductors answered "No," and 43 "Yes." This was a majority of 173 in favour of the present method, or of four to one. In reporting the foregoing result, Mr. Nance adds: "The cost of the method proposed by Councillor Burke would have been £2,500 per annum; whereas the total average shortage in cash of all the conductors only amounts to about 6s. 6d. per week. There would have been special counting offices required to be built in each depot, except Sandy Row. I recommend that the committee act in accordance with the wishes of the great majority of the conductors.

BIRMINGHAM.

WITHDRAWAL OF FIRST-CLASS CARS—EXTENSIONS—OMNIBUS COMPETITION.

Owing to the want of sufficient patronage the first class cars on the Hagley Road route have been withdrawn. To cope with the development of the Sparkhill, Hall Green, and Tyseley districts the tramways have been extended from College Road to Hall Green, and the cars began running on May 31. In accordance with the omnibus company's agreement with the Corporation, under which competition with the tramways is not permitted, it is expected that the company will be given notice to terminate their motor service to Hall Green.

BRADFORD.

EXTENSION OF DEPOT AND SHOPS.

The Tramways Committee have recommended that the tramway depot and workshops should be extended, at an estimated cost of £54,000, and that the tramways be extended from Ann Street to Micklethwaite. The estimated cost of the latter scheme is £15,848.

BRIGHTON.

DOUBLE-DECK RAILLESS CAR—BONUSES TO MOTORMEN.

In his annual report, Mr. William Marsh, engineer and manager of Brighton Corporation Tramways, mentions that sanction was given by the Board of Trade in November last for the use of double-deck railless cars, and a length in London Road of 690 yards was equipped with overhead wires. A double-deck car was hired from the R.E.T. Company, and demonstration runs were made daily for a short period along the route in question. These trials showed, without question, that, notwithstanding the fact that railless traction cars are dependent upon overhead wires for their power supply, that does not detract from their mobility in traffic. This augurs well for their future success at Brighton. The trials in question were very valuable in showing certain points where improvement could be effected. The Board of Trade was subsequently asked to sanction these, and did so, the result being that the Corporation will be able to make a start with vehicles which Mr. Marsh describes as an improvement on any in operation in this country at the present time. The amount paid in bonuses to motormen on the Brighton Corporation tramways for economy in the use of current amounted to £40 during the past year, as against £14 for the latter half of the previous year. The current consumption per car-mile, is however, precisely the same as last year, viz., 1·49 units, the consumption having been previously reduced to this figure by the use of meters. The price paid to the electricity department per unit is still 1·214d., and this bears heavily on the undertaking.

BRISTOL.

RATEPAYERS DECIDE TO PURCHASE THE TRAMWAYS.

By 46 votes to 30 Bristol City Council on May 26 adopted the recommendation of the Tramways Option Committee in favour of purchasing the tramways of the Bristol Tramway and Carriage Company. In the absence of Alderman Pearson, owing to illness, the resolution was proposed by Councillor Gane, and the proceedings were attended by Messrs. J. F. C. Snell and J. B. Hamilton, the experts upon whose report the committee based their recommendation. The two consultants sat by Councillor Gane, together with Mr. Faraday Proctor, the city electrical engineer. Although members were at liberty to put questions to them without their remarks counting as a speech, no interrogations were made. Councillor Gane paid a tribute to the splendid service of the Tramways Company, which now had 3,000 workpeople and 2,000 shareholders in and around Bristol. He confessed to considerable misgiving at first at the thought that the city was going to take the heart out of that undertaking, but the answer was that the company were parties to the option which now confronted the Council. A poll of the ratepayers was taken on June 13 and the figures were published on the following Monday. The result was that 18,057 votes were cast in favour of the purchase and 14,894 against, giving a majority of 3,163. The total number of electors on the register is 71,902, so that less than half of the electors took advantage of the poll. The Corporation will now proceed with their bill to give them the statutory powers to purchase and work the tramways.

BURNLEY.

GOODS SERVICE.

Although the goods wagon has ceased to run on a regular service owing to the receipts not being satisfactory, it is now run by special request for minimum loads. The system has worked very well, and Mr. Mozley, general manager, says it is a pity that the traders have not given it better support.

BURY.

GOODS TRAFFIC SUGGESTED.

The Corporation have instructed the tramways manager, Mr. William Clough, to prepare a scheme for the conveyance of goods on the tramways. The importance of the matter was brought to the attention of the Tramways Committee by the Bury and District Chamber of Commerce, and the vice-president of the chamber is consulting with Mr. Clough, who hopes to make arrangements with the municipal authorities round Bury with a view to producing a practical scheme.

EXETER.

CHEAP MID-DAY FARES—PROTECTION OF MOTORMEN.

Exeter Tramways Committee recently instituted cheap mid-day return tickets available from 12-30 till 2-30 and issued on the cars. The experiment, which has been so far successful, will be continued till September 30 next. In many towns of moderate size there is a fair mid-day tramway traffic because a large proportion of the people are able to go home for their lunch or dinner.– Methods of protecting the drivers of the cars from the weather are under consideration by the Tramways Committee.

GLASGOW.

CO-OPERATION BETWEEN TRACTION AND LIGHTING STATIONS.

A recommendation has been made to Glasgow Corporation, as the result of consideration of reports from the tramways manager and the electrical engineer, that the Pinkston power-station be left under the control of the tramways department, provided that the present arrangements be continued, whereby each department can get, by means of the interconnecting cables between Pinkston and Port-Dundas stations, whatever supply of energy can be spared whenever assistance is required by either department from the other.

GUISBOROUGH.

RAILLESS TRACTION SCHEME.

At a recent meeting of the Guisborough Rural Council a letter was read from a representative of the Trackless Trolley Company, who propose to run trackless cars between Grangetown and Redcar. The writer stated that the plans were not yet complete, but that as soon as they were ready they would be forwarded for the inspection of the Council.

HULL.

MEDICAL EXAMINATION.

By a majority of 29 the Corporation have defeated a resolution for the rescission of their recently-passed regulation requiring all candidates for positions on the tramways to pass a medical examination

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Councillor Hargreaves, the Mayor and chairman of the Tramways Committee, pointed out that 23 of 30 of the most important undertakings had adopted rigid medical examinations before they allowed men to go on their cars.

HUDDERSFIELD.

EXTENSIONS COMPLETED AND PROPOSED—SMALL DOGS IN CARS.

Alderman Aston, chairman of the Tramways Committee, on May 30 opened an extension of the tramways from Elland to West Vale, following an inspection of the line by Colonel Druitt, on behalf of the Board of Trade. The new line is 1 mile 30 yards long, and it links Huddersfield with the Halifax tramways system.—An application received from Stainsland for the extension of Huddersfield tramways system to that district, has been remitted for consideration to the borough engineer and the tramways manager, who will report on the scheme. Critics of Halifax Tramways Committee are urging that body to press forward their lines to Elland and Stainsland.—The Town Council, by a majority of one vote, have adopted a recommendation that small dogs, held on passengers' knees, should be allowed to travel on the cars. They are to be taken into the top compartment, and are to be paid for at ordinary passenger rates. The Corporation will not be responsible for any damage caused by the dogs.

LEEDS.

THERMIT JOINTS—SIDE-GUARDS—ELECTRO-MECHANICAL BRAKES.

It is mentioned in annual report of the general manager of Leeds Corporation Tramways that plans and estimates for the 1914 Parliamentary Bill had been prepared, and also schemes for the construction of mineral railways and sidings for the carriage of goods in different parts of the city. Thermit joints welded on renewals during the year amounted to 887. Of the total of 315 cars, vestibule fronts have been fitted to 123. Side life-guards have been fitted to 192 cars. While it is very difficult to trace accidents in which the side-guard has been the means of preventing serious injury, in two cases, at least, it is very probable that fatal accidents have been averted. The Maley electro-mechanical brake has been fitted to an additional 13 cars for operation on the heavy gradients, 77 cars now being so equipped. In pursuance of the policy of taking a greater portion of the traction load from the electric lighting department, two 1,500 KW. rotary converters have been installed during the year, and another is in course of erection. Although 1,513,254 units less were generated at Crown Point, no corresponding reduction is shown in the power expenses. This is explained by the fact that it has been necessary to maintain stand by plant at Crown Point, ready for immediate use in case of failure of the supply from the electricity department.

LONDON.

ASSISTANT CONDUCTORS FOR L.C.C. TRAMWAYS—A NEW LINK.

Representatives of the London and Provincial Union of Licensed Vehicle Drivers on June 10, waited upon the Home Office and expressed opposition to the granting of licenses to youths to act as assistant conductors on the London County Council cars. Mr. Ellis Griffith, in reply, said he thought it fairly clear that the object of the departure was the safety of the public. He pointed to the ever-increasing number of accidents occurring in the metropolitan district to people alighting from tramcars. In 1911 the number was 550, in 1912 588, in 1913 they totalled 1,165, while if the average for the present year were taken the number would come out about 1,300. The assistant conductors, who will be youths of not less than 16 years of age will first be put on the Tooley Street route, and if the experiment is satisfactory they will be employed also on other routes. The innovation will be greatly to the advantage of the conductors and their opposition seems to have arisen from an unfounded suspicion that the Council proposed to replace men by boys. On Tuesday Major Pringle, of the Board of Trade, inspected an extension of the London County Council tramways which makes a new link between Moorgate and North London. The line runs from Highbury Station to City Road.

MANCHESTER.

WORK OF PARCELS DEPARTMENT.

The receipts of the parcels department of Manchester Tramways for the year ended March 31 totalled £13,990, and after meeting the expenses there was a balance of £3,641 transferred to the tramways account. The chief items of expenditure were £7,053 for salaries and wages, and £974 for horsing. Apparently no motor vehicles are utilised. The number of parcels carried was 1,303,353, or an average of 25,064 per week, as compared with 141,715 and 6,441 respectively in 1907, when the enterprise was inaugurated.

MEXBOROUGH.

RAILLESS TRACTION.

Notice has been given to Mexborough Urban Council by the Mexborough and Swinton Tramways Company of their intention to install the overhead electrical equipment authorised by their Railless Traction Act, 1913.

NOTTINGHAM.

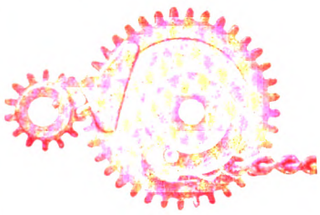
SUCCESS OF MERIT GRADE SCHEME.

Mr. J. Aldworth, the general manager of Nottingham Corporation Tramways, in his annual report says, that the payment of bonuses to

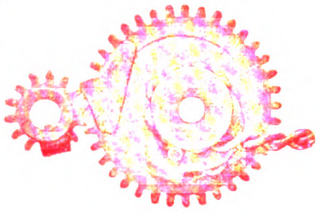
Note the STOPS which form the special feature of The "Peacock"

IMPROVED BRAKE
(Patent),

and prevent the drum from over-running on release.



READY TO WIND.



WINDING.

"PEACOCK" BRAKES

(PATENT)

ARE IN USE ON THE FOLLOWING TRAMWAYS:

MANCHESTER	698
BIRMINGHAM	452
SALFORD	360
METROPOLITAN	278
CROYDON	154
HASTINGS	130
WAKEFIELD	130
RHONDDA	108
NOTTINGHAM	100

NOTE: The stops being cast solid with the wheel and pinion in no way detract from the Simplicity of the Brake nor increase the cost of maintenance.

The "PEACOCK" BRAKE CO., 27, Clements Lane, LONDON, E.C.

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drivers and conductors for economy in the consumption of energy was withdrawn on December 31, and a merit grade was adopted in its place. This resulted in an immediate increase of wages of £1,265 per annum. The scheme has worked quite smoothly and appears to have given general satisfaction.

SALFORD.

A Charge for Parcels.

The Salford Tramways Committee recently agreed to a proposal to charge for parcels other than personal luggage carried on the tramcars. Passenger luggage is defined as small trunks, boxes and workmen's tools, the weight in each case not to exceed 28 lb. Passengers with parcels or articles exceeding this weight will pay a nominal fee.

SINGAPORE.

Additional Power Plant.

In their report for the past year the directors of Singapore Electric Tramways, Limited, state that to meet the increasing demands for power they have, on the advice of the manager, decided to install additional plant, the chief items of which are: One 350-kw. Diesel engine and generator (direct-current), two 187 k.v.a. Diesel engines and generators (alternating-current), one 125 k.v.a. motor generator (alternating-current), and one alternating-current switchboard.

SOUTH SHIELDS.

Express Parcels Delivery.

In reporting a revenue of £307 from the parcels service on South Shields tramways last year the manager observes that the amount was practically all profit. He adds: "The great success attained in other towns by the introduction of an express parcels delivery would point to the desirability of the Tramway Committee considering this convenient and profitable source of revenue in the near future."

STOKE-ON-TRENT.

Council Terms for Extension of the Tramways Lease—Wayleave—Motor Omnibuses.

Stoke-on-Trent Council have agreed to offer the following terms to the Potteries Electric Traction Company, in response to their request for the synchronisation of the dates of option to purchase the tramways and light railways: The date of synchronisation to be December 31, 1940; the company to pay a wayleave of £2,000 a year from January 1, 1915, to December 31, 1927, and from such date to December 31, 1940, £3,000 per annum; to carry out track-doubling at certain places, and to construct a number of loops, at an estimated cost of £35,000; to pay £500 towards the cost of widening Hartshill Road; a fleet of at least six motor omnibuses to be worked on agreed routes; no overcrowding to be permitted; all rails to be laid or relaid to be of a weight of at least 100 lb. to the yard; the excessive noise caused by the tramway system to be forthwith abated; penalties to be imposed for breach of any of the covenants of the agreements; and in the event of the Council applying for powers to run omnibuses or other traction the company will not oppose such application.

WALLASEY.

Merit Bonus with Deductions.

As from January 1 last the Tramways Committee have agreed to a scheme for granting a merit bonus to inspectors, timekeepers, drivers, conductors, and workshop regular staff, subject to deduction for failure to observe the orders and regulations of the department, but no deduction to exceed 5s. for each such failure. The merit bonus is to be at the rate of 9d. per week for first year; 1s. per week after first year; 2s. per week after third year; 2s. 6d. per week after sixth year; 3s. per week after ninth year. All regular employees other than members of the office staff, inspectors, timekeepers, drivers, conductors, and those receiving the merit bonus, as decided by the general manager, are to be granted one day extra holiday per annum for each year's service after the sixth year with a maximum of 12 working days' holiday per annum.

WEST HAM.

Stopping Places of Cars and Omnibuses—Compulsory Mudguard.

As the result of conferences held between representatives of the Tramways Committee, the omnibus companies and the police, the Commissioner has issued regulations fixing the stopping places of motor omnibuses and tramcars in that borough. The result should be a great gain in public safety. It is stated that the Council have reported favourably upon a splash guard which has been submitted to them, and that they are uniting with other authorities in London in bringing the subject before the Home Secretary with a view to a compulsory adoption of the invention by omnibus companies.

WIGAN.

Extensions and Reconstruction.

The construction of a tramway in Wallgate from the L. and N. W. Railway entrance to the Union Bank, and the reconstruction of the line from the Union Bank to the Market Place, has been decided upon. The Town Council will apply to the Board of Trade for sanction to borrow £1,500 to cover the cost of the work.

PATENT LIST.

Specially abstracted for "The Tramway and Railway World" from the Official Journal of Patents.

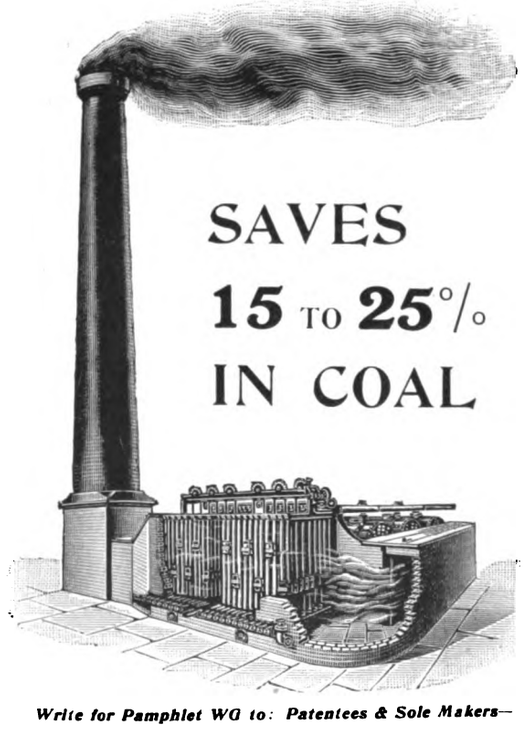
*** If the inventions have been communicated the names of the communicators are given below in italics.

Applications.

The following Applications for Letters Patent have been filed:

12,784 Life-guard for motor omnbuses—W. E. Perry and S. Davies.
12,811 Rail joints—J. Reimann, jun.
12,833 Hollow railway sleeper of reinforced concrete—O. Michael.
12,835 Self-acting shunt for electric cars with subterranean current—S. Bedecs.
12,924 Connecting rails by means of a chair—W. E. Clough.
12,941 Motor control systems—British Thomson-Houston Company Limited (*General Electric Company*).
12,955 Fluid-pressure braking apparatus—W. V. Turner.
12,957 Railway signalling—C. J. Cooke, A. H. Johnson, and F. Downes.
12,961 Train-stopping apparatus—F. Northup, C. A. Overacker, and G. Marklie.
13,089 Signalling devices for railways and tramways—L. T. Jones.
13,097 Railway signalling—J. Saul and T. E. K. Greenhalgh.
13,147 Series-parallel control systems for electric motors—British Thomson-Houston Company, Limited (*General Electric Company*)
13,213 Tightening overhead electric conductors—Siemens-Schuckertwerke G. m.b. H.
13,231 Control for electric motors—British Thomson-Houston Company, Limited (*General Electric Company*).
13,279 Rail joints—H. R. Martindale (*A. Shepherd*).
13,400 Fish plates—C. W. von Roemer and F. C. Lynde.
13,425 Safety appliances for preventing the overrunning of trains.—S. Pollitt.
13,433 Actuating brakes on moving vehicles from controlling apparatus on the permanent way—F. Alcock.
13,502 Stopping runaway tramcars—W. Jackson.
13,537 Brake apparatus—E. S. Luard.

GREEN'S ECONOMISER



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13,641 Safety brakes and guards to tramcars, etc.—R. F. Dampier.
13,751 Car seats—C. K. Mills.
13,871 Suspended vehicle transmission systems—J. P. Roe.
13,883 and 13,884 Railway safe-running devices—A. R. Angus.
13,896 Shield for truck axle springs of tramway vehicles, etc.—H. O. White.
13,916 Railway safe-running devices—A. R. Angus.
13,945 Electric railway connections—F. de Palma.
13,946 Anti-rail creepers—H. G. Elfborg.

SHARES FOR SALE.

Quantity Cumulative Preference and Ordinary Shares, paying dividends in well-known Brake Block and Tramway Appliances Company, with excellent prospects. Apply, Box No. 77, THE TRAMWAY AND RAILWAY WORLD, Amberley House, Norfolk Street, London, W.C.

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13,961 Signalling by detonators—Cie. de Signaux Electriques pour Chemins de Fer.
13,978 Apparatus for use in operating switch points—F. H. Smethurst.
14,036 Friction blocks for brakes—Soc. Francaise Metallurgique and Soc. G. Getting and A. Jonas.
14,091 Points and crossings—V. G. Lironi.
14,098 Current collectors for electric tramways—Cie. Générale des Omnibus de Paris.

SPECIFICATIONS PUBLISHED.

1913.

7,805 Electrical conductors and means for supporting same—British Insulated and Helsby Cables, Limited, Mordey, Astley, and Saunderson.
10,416 Electric motor control apparatus—Railing and Garrard.
11,847 Welding of rail joints—Wattmann and Tudor Accumulator Company.
16,294 Rail joints—Ravn.
17,257 Rail joints—Deppisch.
25,180 Welding of rails—T. H. Goldschmidt Akt-Ges.
28,963 Insulated railway van—Hunt (*Gresham*).
3,857 Trolleys for electric traction—Munro and R.E.T. Construction Company.
10,891 Car movers—Atkinson.
11,629 Trolleys for electric traction—Munro and R.E.T. Construction Company.
14,906 Apparatus for stopping trains independently of drivers—Brunskill.
17,129 Track system for railways—Fernandez.
25,676 Railway car seats—Bennett.
28,793 Motor omnibuses—Graham and Fyfe.
11,695 Brake blocks—Frood.
11,698 Couplings for motor and trailer vehicles—Harvey.
11,813 Construction and operation of steam superheaters and generators—Cruse.
14,735 Appliances for automatically stopping trains—Green.
19,076 Seats for omnibuses, tramcars, etc.—Keen.
24,067 Vacuum brake apparatus—Luard.
24,579 Railway signalling apparatus—Kehrhahn.
11,951 Reinforced concrete railway sleepers—Green.
12,406 Means for the regulation or control of railway traffic—Von Kramer.
14,796 Electric motor control systems—British Thomson-Houston Company (*General Electric Company*).
18,601 Double-decked cars—Spangler.
23,894 Means for stopping trains independently of drivers—Bassett.
57,474 Train despatching and signalling systems—Simmen.
29,128 Brakes—Lancia and Company.
15,658 Electric railways—White (*Sturges*).
16,602 Wheel guard for rail and other vehicles—Gooding and Sweeney.

1914.

5,713 Double-decked vehicles for tramways and railways—Spangler.
751 Motor-driven vehicles—Von Kando.
8,514 Method of reinforcing concrete railway sleepers—Green.
5,973 Rail joints—Evans.
6,634 Railway rails—Brewster.

TRAFFIC RETURNS.

Colonial and Foreign Tramways.

NAME OF COMPANY.	1913. WEEKS ENDED.					1914. WEEKS ENDED.					AGGREGATE.		
	May 31.	June 7.	June 14.	June 21.	June 28.	May 30.	June 6.	June 13.	June 20.	June 27.	Wks.	1914.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Anglo-Argentine	58.260	56.386	55.589	54.782	53.652	55.557	58.655	55.745	54.387	51.759	26	1,457.739	+ 5.958
Auckland ... ... (28 days)	...	20.007	...	...	...	...	20.919	...	...	...	48	247.311	+ 6.331
Brazilian Street ... (month) Mlrs.	44.820	...	...	...	...	50.237	...	...	...	...	43	523.872	+ 76.626
Brazilian Traction	90.492	92.492	93.907	93.641	88.507	92.800	96.067	96.933	95.867	94.800	26	2,460.136	+ 99.684
Brisbane ... ...(month)	26.560	...	...	...	...	29.860	...	...	...	...	22	140.385	+ 14.395
British Columbia ... (month) $	701.991	..	...	...	...	678.314	...	...	...	...	48	8,128.904	+317.358
Buenos Aires Port and City (month)	6.925	...	...	...	...	6.713	...	...	...	...	22	36.517	+ 3.206
Buenos Ayres Lacroze ...(month)	45.274	...	...	...	...	44.890	...	...	...	...	48	490.426	+ 5.927
Calcutta ... ... Rs.	58.896	48.296	59.442	64.176	61.386	62.792	65.830	65.404	64.846	64.444	26	17.35.370	+ 96.972
Cape Town ... ...(month)	...	...	...	...	...	...	...	...	...	...	—	—	—
Carthagena and Herrerias (month)	2.051	...	...	...	...	2.202	...	...	...	...	22	12.391	+ 2.782
Cordoba ... ...(month)	13.622	...	...	...	...	14.680	...	...	...	...	8	28.094	+ 1.448
East India ... ...(month)	1.867	...	...	...	...	1.885	...	...	...	...	43	19.124	+ 735
Kalgoorlie ... ...(month)	3.059	...	...	...	...	3.025	...	...	...	...	22	12.830	- 1.542
La Plata ... ...(month)	5.130	...	...	...	...	4.727	...	...	...	...	22	24.683	- 2.042
Lima ... ...(month)	32.256	...	...	...	...	33.150	...	...	...	...	22	173.754	+ 6.825
Madras ... ... Rs.	28.339	(2 weeks)	24.344	(2 weeks)	26.556	27.766	2 weeks)	28.000	(2 weeks)	27.685	26	345.669	+ 26.504
Manaos ... ... (month)	12.877	...	...	...	...	10.199	...	...	...	...	5	10.199	- 2.678
Melbourne ... ...(month)	62.000	...	...	...	...	64.500	...	...	...	...	22	327.000	+ 3.000
Mexico ... (month) $	595.795	...	...	...	...	592.275	...	...	...	...	22	2,938.082	+261.322
Montevideo ... ...(month)	29.831	...	...	...	...	29.016	...	...	...	...	31	229.192	- 401
Para ... ... (month)	25.924	...	...	...	...	22.465	...	...	...	...	26	129.509	- 26.036
Port Elizabeth ... ...(month)	...	...	...	...	...	...	...	...	...	...	—	—	—
Puebla ... ... (month) $	61.400	...	...	...	...	65.300	...	...	...	...	22	328.800	+ 35.100
Rangoon ... ...(month)	5.206	...	...	...	...	5.323	...	...	...	...	22	27.337	+ 792
Shanghai ... ... $	19.086	20.440	25.130	24.477	22.327	25.400	28.600	26.400	23.800	25.000	25	613.400	+ 95.522
Singapore ... ... $	11.324	12.238	12.878	11.778	11.666	11.933	12.202	11.927	11.112	11.221	26	310.105	+ 7.609
Toronto ... ... (month) $	811.872	...	...	...	...	871.733	...	...	...	...	22	4.163.988	+323.708
Winnipeg ... ... (month) $	326.827	...	...	...	...	337.664	...	...	...	...	22	1.756.539	+105.203

(Continued on page 50).

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TRAFFIC RETURNS—*continued.*

Tramways and Omnibus Undertakings in the United Kingdom.

NAME OF COMPANY OR CORPORATION.	1913. WEEKS ENDED.					1914. WEEKS ENDED.					AGGREGATE.		
	May 31.	June 7.	June 14.	June 21.	June 28.	May 30.	June 6.	June 13.	June 20.	June 27.	Wks.	1914.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Aberdeen Corporation	2.481	(11 days)	2.454	1.710	1.591	2.797	(10 days)	2.390	1.790	1.780	3	6.151	+ 396
Accrington Corporation	554	540	579	592	589	559	688	599	612	687	12	7.444	+ 475
Ayr Corporation	289	365	359	392	395	335	400	402	452	409	6	2.464	+ 268
Bath Electric	952	1.366	1.202	985	1.197	1.065	1.446	1.115	1.173	1.321	25	22.724	+ 1.747
Birkenhead Corporation	1.471	1.292	1.307	1.276	1.280	1.223	1.396	1.259	1.264	1.320	12½	16.464	+ 169
Birmingham Corporation	11.693	11.545	11.436	11.580	11.420	12.522	14.206	12.599	12.873	12.708	13	161.360	+ 13.789
Blackburn Corporation	1.320	1.334	1.294	1.445	1.290	1.233	1.715	1.197	1.439	1.381	13	18.122	+ 1.453
Blackpool Corporation	962	1.555	1.099	1.435	1.690	778	3.728	2.278	1.607	1.788	13	19.633	+ 3.475
Bolton Corporation	2.703	2.732	2.880	2.761	2.810	2.742	3.064	2.979	2.848	2.918	13	37.150	+ 2.098
Bournemouth Corporation ...	1.959	1.900	2.045	2.000	2.110	2.779	2.065	2.098	2.170	2.225	13	28.168	+ 1.900
Bradford Corporation	6.089	6.123	6.216	6.177	5.971	5.920	7.661	6.292	6.450	6.149	13	81.642	+ 5.048
Brighton Corporation	1.059	1.008	1.064	1.097	1.375	1.089	1.293	1.101	1.118	1.435	12½	14.299	+ 1.160
Bristol	8.485	8.373	7.867	8.615	8.690	8.370	12.305	8.855	9.757	9.547	25½	209.480	+ 20.258
British Electrical Federation ...	50.704	50.646	48.425	52.294	52.062	53.983	72.394	55.930	59.127	60.888	—	—	—
Burnley Corporation	1.649	1.693	1.626	1.646	1.623	1.551	1.996	1.609	1.607	1.629	13	22.256	+ 785
Burton-on-Trent Corporation ...	294	276	318	291	277	298	342	304	301	304	13	3.870	+ 205
Bury Corporation	1.341	1.396	1.417	1.377	1.359	1.318	1.544	1.475	1.382	1.438	12½	18.178	+ 582
Cardiff Corporation	2.652	2.691	2.694	2.913	...	2.679	3.491	2.937	2.936	...	11	33.694	+ 2.357
Chatham and District	951	1.022	919	1.011	953	829	1.181	881	981	1.068	25	22.429	+ 359
Chesterfield Corporation	253	255	246	259	251	247	347	251	266	252	12	3.519	+ 390
Colne Corporation...	301	312	297	300	279	275	359	279	302	287	—	—	—
Cork Electric	528	532	515	559	555	505	539	499	593	554	25	12.236	+ 249
Croydon Corporation	1.833	1.758	1.624	1.772	..	1.643	2.220	1.678	1.792	...	11	20.899	+ 1.522
Darlington Corporation	251	258	247	250	256	252	290	263	264	270	13	3.403	+ 190
Derby Corporation	1.004	987	1.002	1.069	986	989	1.278	1.021	1.064	1.036	12½	13.200	+ 700
Dover Corporation	253	241	210	263	249	222	304	224	236	252	13	3.059	+ 86
Dublin and Lucan	154	180	168	175	267	145	231	141	180	312	26	3.583	+ 24
Dublin United	6.660	6.527	6.078	7.313	6.436	5.651	6.979	5.942	6.916	6.657	26	143.819	- 3.453
Dundee City	1.301	1.364	1.298	1.335	1.297	1.275	1.399	1.331	1.370	1.370	5½	7.724	+ 182
East Ham Corporation	987	960	955	980	1.020	988	1.225	1.128	1.154	1.138	12½	13.620	+ 617
Exeter Corporation	336	343	348	356	359	331	468	352	379	371	13	4.608	+ 374
Gearless Motor 'Buses	473	518	491	558	597	495	501	480	506	512	26	12.139	+ 7.916
Glasgow Corporation	21.127	21.033	20.845	21.164	20.860	21.946	22.232	21.824	22.074	22.352	4	86.217	+ 6.610
Glossop (Urban Elec. Supply Co.)...	126	129	129	146	130	115	127	127	135	124	26	3.207	- 86
Halifax Corporation	2.169	2.253	2.054	2.226	2.215	2.045	3.131	2.164	2.346	2.261	12	27.462	+ 1.693
Hastings and District	1.032	1.024	878	1.093	1.033	961	1.384	984	1.128	1.080	25	22.032	+ 303
Huddersfield Corporation	2.193	2.186	2.127	2.279	2.143	2.161	3.295	2.348	2.549	2.358	13	30.685	+ 3.164
Hull Corporation	3.078	3.099	3.080	3.063	3.114	2.966	3.325	3.084	3.084	4.223	13	40.870	+ 1.577
Ilford U.D. Council	479	469	450	474	483	459	674	539	597	617	12	6.737	+ 902
Ilkeston Corporation	140	134	142	136	137	156	121	131	141	163	13	1.788	+ 23
Ipswich Corporation	425	467	452	494	492	446	598	464	522	532	13	6.121	+ 542
Isle of Thanet	662	694	740	909	956	585	979	709	880	1.014	39	17.054	+ 841
Kilmarnock Corporation	174	167	176	176	173	166	167	170	172	171	6	1.091	- 52
Lanarkshire	1.725	1.754	1.729	1.785	1.749	1.911	1.981	1.912	2.012	1.975	25	47.737	+ 6.301
Lancashire United	1.617	1.547	1.494	1.661	1.580	1.569	1.866	1.766	1.811	1.703	25	41.087	+ 4.657
Leeds City	8.621	8.663	8.298	8.790	8.403	8.127	10.097	8.567	8.955	8.466	13	109.564	+ 4.659
Leicester Corporation	3.039	2.970	2.882	3.002	3.003	2.893	3.466	2.962	3.088	3.028	26	74.344	+ 3.789
Leith Corporation...	732	740	725	766	752	740	774	743	789	783	6	4.762	+ 184
Leyton U. D. Council	1.453	1.359	1.343	1.454	1.530	1.330	1.767	1.387	1.478	1.541	12	17.333	+ 830
Liverpool Corporation	13.191	13.251	13.061	13.511	13.170	13.499	14.249	13.312	13.888	13.407	25½	333.334	+ 15.679
Llandudno and Colwyn Bay ...	263	272	331	381	417	257	705	415	376	424	30	6.917	+ 56
London County Council	42.630	42.487	41.996	42.998	42.997	43.762	47.346	42.788	43.837	44.726	12	538.730	+ 24.887
London General Omnibus... ...	74.553	71.898	67.716	74.515	72.466	67.752	77.299	68.677	74.548	75.924	26	1.610.028	+ 34.262
London United	7.890	7.028	6.520	7.413	7.306	5.969	9.692	6.138	6.487	7.096	26	156.179	+ 2.542
Lowestoft Corporation	183	189	184	199	219	196	265	206	216	217	38	7.167	+ 779
Maidstone Corporation	205	212	196	210	211	187	272	187	211	216	13	2.726	+ 188
Manchester Corporation	17.908	18.307	17.786	18.446	17.597	17.556	18.919	17.780	18.869	18.238	13	229.316	+ 6.649
Metro. Electric Tramways ...	10.137	9.508	9.306	10.055	9.778	9.102	11.656	9.383	9.738	10.128	26	232.491	+ 4.989
National Steam Car	4.855	3.284	3.199	3.459	4.796	6.824	5.450	4.926	5.099	7.537	34½	145.478	+ 60.494
Nelson Corporation	206	210	204	219	232	267	231	195	223	204	12½	2.785	+ 94
Newcastle-on-Tyne Corporation ...	4.645	4.792	4.747	4.853	8.075	5.134	5.430	5.130	5.278	8.668	13	69.392	+ 6.613
Newport (Mon.) Corporation ...	731	718	742	749	769	792	1.042	834	828	837	13	10.719	+ 1.240
New St. Helens and District ...	843	905	857	927	838	816	1.229	821	913	873	52	42.791	+ 3.348
Northampton Corporation... ...	627	573	576	605	591	544	790	572	622	595	12½	7.531	+ 273
Nottingham Corporation	3.375	3.471	3.343	3.462	3.332	3.243	4.089	3.376	3.504	4.167	12½	43.777	+ 2.098
Oldham Corporation	2.153	2.146	2.279	2.271	2.165	2.287	2.288	2.487	2.321	2.408	14	32.165	+ 2.330
Portsmouth Corporation	2.165	2.522	2.177	2.286	2.587	2.076	3.002	2.835	2.402	2.793	13	30.917	—
Preston Corporation	848	878	852	887	834	809	1.162	822	897	873	13	11.680	+ 366
Provincial...	1.934	2.127	1.874	2.100	2.119	1.804	2.744	2.026	2.049	2.370	39	70.500	+ 4.243
Reading Corporation	703	686	674	729	713	659	894	696	766	749	12	9.016	+ 695
Rhondda Tramways	1.064	1.143	1.144	1.210	1.218	1.155	1.664	1.279	1.166	1.215	25	31.046	+ 1.708
Rochdale Corporation	1.589	1.651	1.587	1.637	1.574	1.552	1.808	1.628	1.647	1.586	13	21.124	+ 775
Rotherham Corporation	962	946	991	950	974	1.382	1.011	1.007	1.009	1.058	13	13.363	+ 699
Salford Corporation	5.229	5.125	5.438	5.270	5.280	5.171	6.449	5.302	5.419	5.443	13	68.438	+ 1.224
Sheffield Corporation	7.427	7.363	7.500	7.445	7.395	7.624	8.597	7.580	7.627	7.684	13½	104.635	+ 4.374
Southampton Corporation... ...	1.333	1.385	1.263	1.363	1.337	1.260	1.657	1.357	1.418	1.473	12	16.717	+ 1.035
Southend-on-Sea Corporation ...	868	927	868	980	992	918	1.424	1.016	1.097	1.181	13	12.426	+ 2.254
South Metro. Tramways	983	1.075	891	973	937	1.196	1.514	1.128	1.154	1.195	26	27.984	+ 7.356
South Shields Corporation ...	709	744	688	771	919	742	943	762	799	1.038	12½	10.100	+ 1.237
Sunderland Corporation	1.420	1.488	1.451	1.490	1.621	1.425	1.838	1.510	1.513	1.702	13	19.096	+ 1.012
Swindon Corporation	165	180	172	179	168	165	221	174	179	180	12	2.186	+ 206
Torquay Tramways	582	546	555	591	616	516	860	603	651	645	25	13.014	+ 456
Tramways (M.R.T.) Omnibus Co. ..	4.379	4.857	4.676	5.250	5.433	9.018	10.503	9.477	10.121	10.358	26	228.450	+169.384
Tyneside Tramways and Tramroads	527	559	509	571	1.722	522	721	522	590	1.823	25	14.638	+ 918
Wallasey Corporation	1.233	1.261	1.213	1.311	1.238	1.257	1.641	1.302	1.398	1.323	12½	16.645	+ 1.282
Walsall Corporation	629	813	592	617	602	616	830	594	615	616	26	16.101	+ 342
Walthamstow U.D. Council ...	834	753	729	898	748	759	1.086	804	973	886	13	10.857	+ 1.319
Warrington Corporation	448	457	472	453	444	439	471	447	437	431	12	5.433	- 93
West Ham Corporation	2.853	2.764	2.727	2.832	2.850	2.779	3.259	2.767	2.881	3.018	12	35.859	+ 1.730
Wigan Corporation	1.515	1.441	1.459	1.528	1.449	1.518	1.780	1.427	1.491	1.437	12	18.939	+ 634
Wolverhampton Corporation ...	1.070	1.036	1.077	1.045	1.086	1.662	1.022	1.070	1.039	1.109	14	14.726	+ 540
Yorkshire (West Riding)	1.503	1.416	1.455	1.441	1.460	1.487	2.007	1.401	1.402	1.443	26	37.793	+ 1.130

Electric Railways.

NAME OF COMPANY.													
Central London	4.552	4.595	4.630	4.498	5.282	4.889	4.960	4.973	4.631	5.085	26	130.453	- 2.790
City and South London	2.529	2.584	2.606	2.488	2.605	2.641	2.605	2.566	2.478	2.587	26	70.352	- 4.248
Liverpool Overhead	1.736	1.735	1.732	1.821	1.826	1.841	2.010	1.646	1.796	1.801	26	44.460	+ 1.509
London Electric	12.640	13.420	13.405	12.955	13.685	13.690	14.220	13.725	13.040	13.410	26	369.290	+ 2.500
Mersey	2.094	2.194	2.220	2.232	2.072	2.179	2.399	2.240	2.250	2.098	26	58.518	+ 389
Metropolitan	17.358	17.384	17.840	17.835	17.746	19.389	19.820	19.573	19.478	19.579	26	473.875	+ 41.268
Metropolitan District	12.640	13.306	13.169	13.120	13.902	13.251	13.638	13.112	13.008	13.412	26	342.336	+ 584

TRAMWAY DIRECTORIES.

A useful feature of this issue is the directory of electric railways and electric tramways which will be found among the advertising pages. This directory contains the names of the chief officals and the principal particulars relating to each undertaking.

The directory is revised as occasion requires, and is the most up-to-date and comprehensive list published.

The Tramway & Railway World can be obtained, post free, at the following rates:
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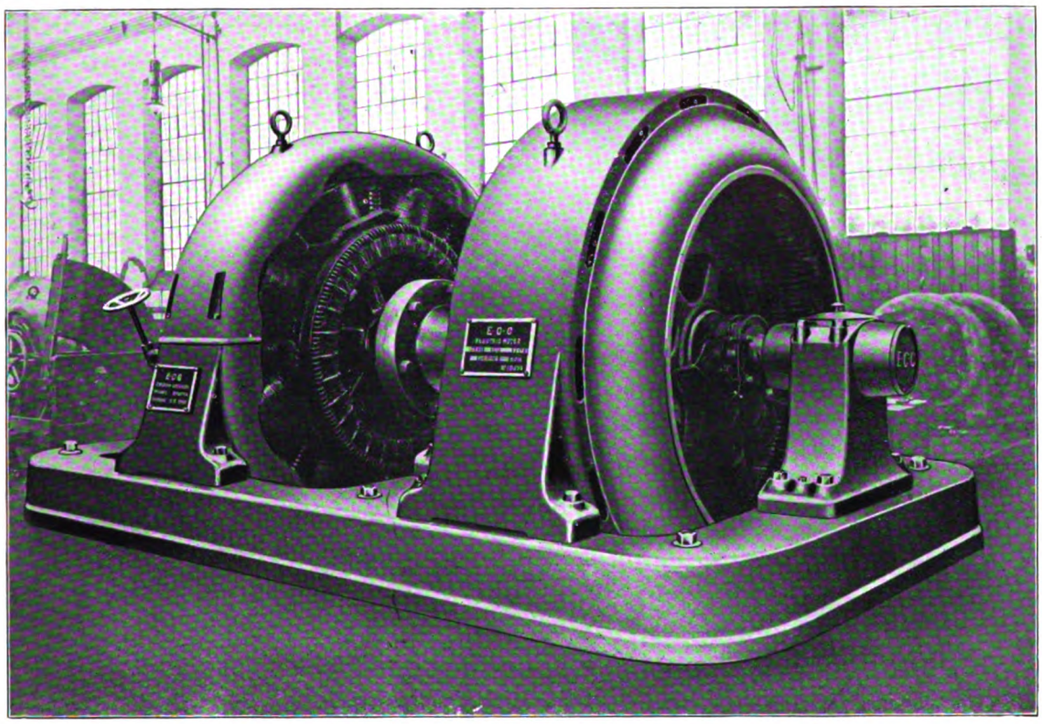

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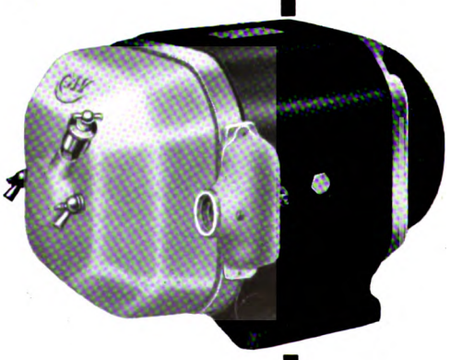

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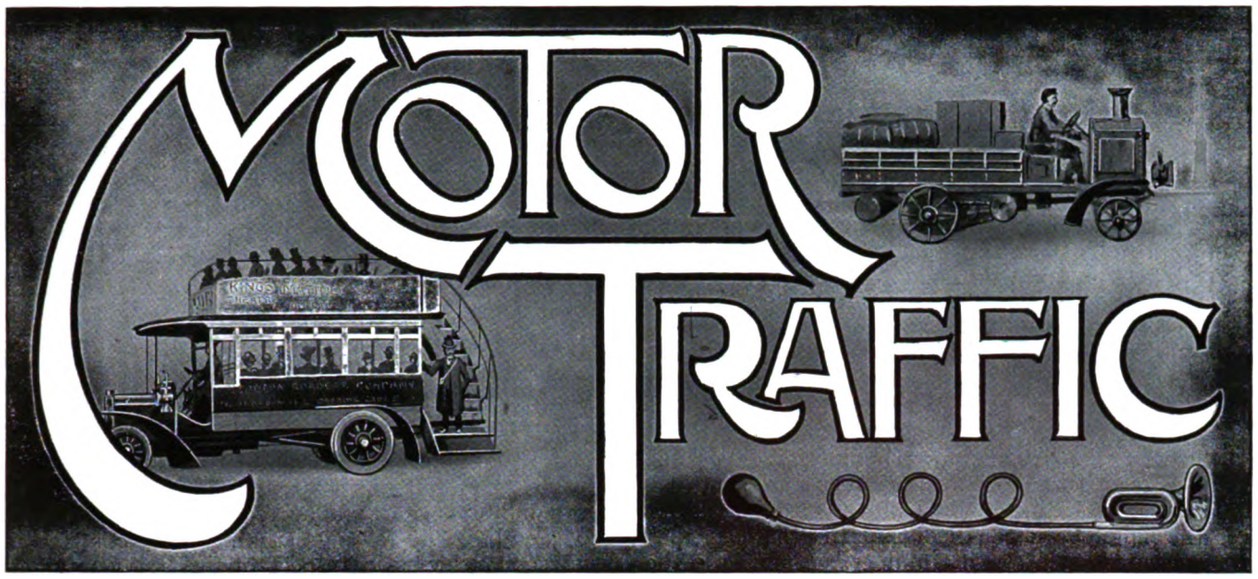

Since our comment in a recent issue on the very different working conditions of tramways and of railless or motor traffic, in regard to road maintenance expenses, there have been yet other developments tending meantime to emphasise these differences to a still greater degree. For one thing, repeated judicial decisions may be said to have thrown definitely upon road authorities or bridge owners the responsibility of making all highway bridges sufficiently strong to carry the traffic to be reasonably expected upon them, not at the time they were built but as may be found the case to-day. In many instances this must mean the entire rebuilding of numerous highway bridges, designed to serve quite well for farmers' carts and wagons, but not for heavy motor vans or quick-running motor omnibuses; and no part of this rebuilding cost can at present be claimed from the users of these latter vehicles. They have full leave and license to use the public highways without any payment to the road authority for such user; and the roadway must be improved and made fit to carry the new traffic by the authority at its own cost. That so much should have been done in this direction already, speaks volumes for the enterprise of the English road authorities, and it is sincerely to be hoped that the proposal to refer to a Joint Committee of both Houses of Parliament the whole question of direct compulsory contribution by heavy motors of all kinds to the cost of highway maintenance may be carried out at once and result in some reasonable alteration in existing conditions.

As has been said by a high official, we do not want to go back to the days of toll gates and bars, but there should be no need for this. A greatly-increased licence fee payable by tractors, traction engines, and heavy motors, which as a rule are not continually running upon the same roads, and a direct contribution to maintenance costs of the roads affected by regular motor services, based on the mileage run, would appear to be no more than reasonable, the proceeds in the first case being apportioned in accordance with the amount of use made of the roads and the cost of their upkeep. Care, of course, must be taken that no excessive levies shall be made on what is still a new industry, and one, moreover, dependent to a large extent for motive power upon the use of petroleum products that are liable to sudden and heavy rises in price; but on the other hand the greater cheapness of rubber for tires has enabled many railless and motor services to continue profitable working even when paying twice as much for petrol or other fuels.

It is something to the credit of municipal and other authorities in England that they have on the whole welcomed and fostered these road services, without from the outset insisting upon substantial payments for road use. Hitherto, however, such an obligation has only been possible in an indirect fashion, upon the application by promoters of road services to the authority for licences to run the vehicles, and could not even then be insisted upon although the authority possesses in England at least the power to refuse such licences. In Scotland, licences to run cannot be withheld by the authority from those who wish to maintain services, the general Act in England reading "*may* issue" and that in Scotland "*shall* issue" licences to applicants—a difference in wording that has not, however, implied quite the same moral obligation upon all the Scottish road authorities to improve their roads as upon their fellow authorities in England.

On several occasions we have referred to claims that can be advanced for the use of the single-deck omnibus in preference to the double-deck vehicle. The question was indirectly raised by Mr. Fearnley in the course of his presidential address at the Municipal Tramways Conference last year, when he observed that the carriage portion of omnibuses was somewhat crude and ugly, and followed much too closely upon the lines of the old horse omnibus. The general manager of the Sheffield Tramways recently directed attention to another aspect of the matter in a letter forwarded by him to the author of a paper on omnibuses in provincial towns, which was read before the Southampton Chamber of Commerce. "A weakness of the omnibus," said Mr. Fearnley, "is its limited carrying capacity, as during the winter this is only one-fourth the comfortable carrying capacity of the tramcar. The difficulty here, as in other places, is to arrange for a cover for the vehicles on the top deck in winter." Probably a step towards lessening the foregoing objections would be taken if managers were more largely to adopt the single-deck conveyance, especially as it can now be fitted with a more commodious body. An illustration of the improved body, as used on the Dennis chassis, is given on another page. The fact that it provides comfortable accommodation for 33 persons renders its capacity only a few units below that of the double-deck vehicle in fine weather.

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MOTOR TRAFFIC.

There are places where the adoption of single-deck omnibuses is essential. One such town is Wolverhampton. The manager of the tramways there has stated that the object in adopting a small omnibus of the single-deck type was that accommodation for 24 to 26 passengers during the greater part of the day was ample in conjunction with a 15 to 30 minutes' service. He might have added that single-deck cars would not arouse inhabitants of residential suburbs to a display of the indignation that sometimes accompanies the starting of a double-deck service. It is important to note that with the vehicles in use in Wolverhampton it is possible for the windows to be removed in the summer time. This facility for securing full advantage of fresh air gives the single-deck car the popularity that attaches to the elevated open top in summer. As regards the opportunity for sightseeing, the single-deck is high enough for reasonable purposes, and it is free from the risk of overturning. Another matter to which body builders might well turn attention is the devising of means for enabling the conductor to gain access to the driver's seat from the interior of the saloon. An accident might occur in a second in the event of the driver being seized with serious illness, but there may be occasions when untoward results could be averted if it were possible to obtain speedy access to the steering wheel. That the public are not enamoured of the ordinary double-deck body and its interior seating is shown by the manner in which they give preference to the Allen bodies in London, and also by the fact that the builders of petrol-electric vehicles have lately made an arrangement to supply the type of body designed by Mr. Ellison, of the Eastbourne omnibus department.

It is to be regretted that no indications have been forthcoming of a traction authority having considered the suggestion which Mr. Fearnley put forward at the Sheffield Conference, to the effect that an experiment should be made in omnibus working on a route where the tramways require to be relaid. Mr. Fearnley's idea is to take up the rails and to lay down a suitable surface for omnibuses or trolley cars. The ideal method would be to treat two such routes in that manner, using one for omnibuses and the other for trolley vehicles. The cost of working and maintaining the tramways which the other forms of traffic would supersede would be well known, and the adoption of either of the two innovations would enable a thorough comparison to be made between conveyances running on rails and without rails. As Mr. Fearnley observed, if the motor or trolley vehicle is anything approaching in its completeness, reliability, and capacity the claims put forward by its advocates, there need be no hesitation in adopting that course. It is worth noting what advantages were offered to the selected district by so experienced a manager as Mr. Fearnley. Among them were a quiet-running vehicle; the entire absence of rails; the probability of a more frequent service but with less saloon or covered accommodation; and the opportunity for the road authority to provide an ideal surface for modern forms of traffic. At the time he made the suggestion, Mr. Fearnley observed that whether it were adopted or not it was advisable for all tramway systems to make some experiments with the omnibus, and if the Sheffield experience were any criterion there need be no hesitation in doing so, even if the omnibuses were used only as feeders. Quite recently he has repeated his favourable experience of omnibus working before Parliamentary Committees. In putting forward his idea for the test of systems he was doubtless partly actuated by the knowledge that Sheffield possesses tracks that will require to be largely renewed before long. Why not, therefore, bring the proposal before the Tramway Committee of that city?

It was evident that the presentation in March last of the report of the Departmental Committee on Local Taxation came at too late a period to enable the Chancellor of the Exchequer to deal in the Budget with the recommendation for a revision of the whole system of licence duties and registration fees paid in respect of heavy motor vehicles. The report also advised that provision be made for a greatly increased contribution from such vehicles in respect of the heavy wear and tear of the roads entailed by such traffic, and that a more equitable distribution of such contributions be effected between local authorities. In view of the demands that are being made upon the ratepayers for improved roads, it is not to be expected that trade motor cars or motor cars that are hackney carriages can much longer remain outside of the variation and enlargement of the duties effected by the Finance Act, 1910. Under that Act trade and public passenger motors also pay only three halfpence instead of the full duty of threepence per gallon on petrol by which the Road Board are provided with funds. The position at present is that motor cars of whatever weight, which are not subject to duty under the Custom and Inland Revenue Act, 1888, escape annual duties altogether, the only contribution made in respect of them to county council or county borough funds being the fee of £1 paid once for all on registration and an annual sum of five shillings for the driver's licence. Motors which are classed as hackney carriages are charged with a carriage duty of 15 shillings a year, and with the additional duty of two or three guineas according to weight.

The whole question was brought to a head on June 25 by a deputation from the County Councils and Urban Councils Associations waiting upon the President of the Local Government Board, when Mr. Samuel promised to appoint a technical committee to consider the question of the weight per axle permitted to be carried by traction engines and heavy cars. While that committee are engaged on their task it would be appropriate if attention were given to steel-studded pneumatic tires. These, combined with the speed of the vehicles using them, are more destructive of the roads than smooth-tired traction engines and heavy motors, and their use is condemned by considerate motorists. Mr. Samuel intends to suggest the appointment of a Joint Select Committee to report on the deputation's proposals to exact road maintenance from railless trolley cars and motor omnibuses, and to give power to road authorities to regulate the running of such vehicles over their roads. These are matters upon which municipal representatives, in giving evidence before the proposed committee, will doubtless find themselves at variance with the county and urban councils, who have lost no opportunity of asking Parliament to impose road charges when corporation bills have been under consideration. The demand for power to regulate the running of such vehicles is a new one, and should be strongly opposed by their owners, who must be permitted the fullest liberty to cultivate traffic and to study the convenience of the public.

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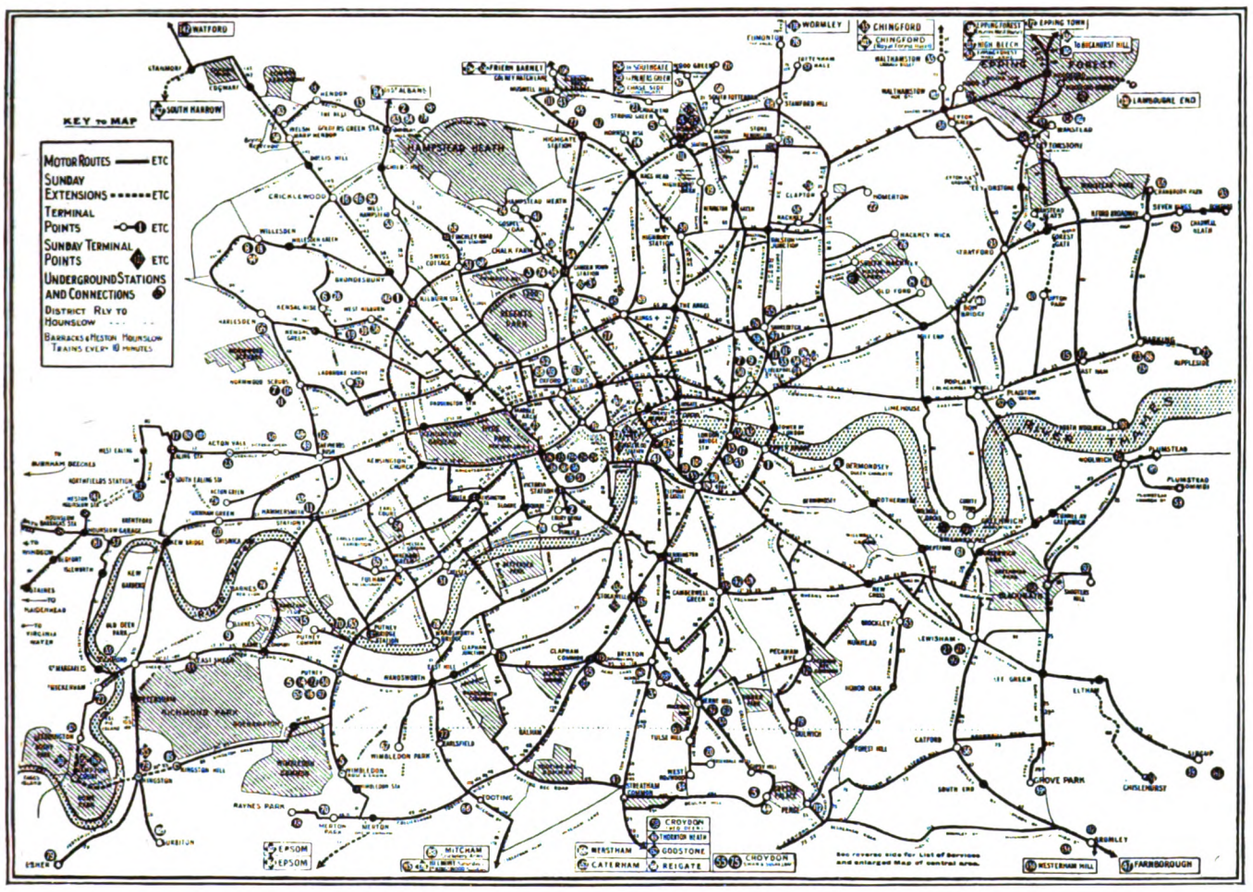
MOTOR TRAFFIC.

LONDON MOTOR OMNIBUS SERVICES.

It was in July, 1910, that the London General Omnibus Company first issued a folder comprising a map of the routes and a list of the services run by their vehicles. There were at that time 22 services, and nine months later they numbered 26. In February, 1912, when a reproduction of the map was published in THE TRAMWAY AND RAILWAY WORLD there were 57 services. The map given on this page is reduced to less than a quarter of the size of that shown in a recent folder, but it will serve to give an idea of the ramifications of the most extensive omnibus service in the world. It is maintained by 3,000 vehicles owned by the London General Omnibus Company, Tillings, Limited, the New Central, the British National Steam Omnibus, Metropolitan Electric Traction Company, and the Southern (South Metropolitan Tramways Company), who are all working in agreement.

Motor 'Bus," below an enlarged map of the central area. The latter map gives a better idea of the extent of the motor omnibus traffic in the centre of the metropolis. In that territory the horse omnibuses, with the exception of the services across Blackfriars Bridge to Farringdon Street Station, and from Waterloo Station to Somerset House, have disappeared, while in the whole of the metropolitan district there are now only some two or three horse services.

In the folder for the current month a number of alterations have been made. The map of central London is omitted, while the other map has been considerably curtailed. This has enabled the services to be shown more clearly. The space thus gained has been filled by the insertion of more particulars concerning the services, including the time of the first and last omnibus (as in the County Council tramways folder). The frequency of the service is also given, together with the fare. On a separate sheet is printed a list of the country routes embraced in the major publication. These number 53, and they run to all points of the compass, bringing in much revenue at week-ends



Map of 170 Routes Traversed by 3,000 Motor Omnibuses in London and Vicinity.

On weekdays the number of services is about 180, and on Sunday there are numerous extra services, which take in many additional rural routes. Even on weekdays the vehicles run to such distant places as Watford in the north-west, Romford in the north-east, St. Albans in the north, and Reigate and Godstone in the south.

The journey to the latter place, starting from Stockwell (2½ miles from Westminster Bridge), occupies 113 minutes, which, with the run between "The Elephant" and Epping Town, were, until just lately, the longest of the journey times. An additional feature of the present map is the indicator showing the stations of the Underground Railway and connections with omnibus routes. Through ticket routes are gradually being opened up between points on the two systems, and posters on the stations announce that "Where the Railway Ends the Motor 'Bus Begins."

"Open Air to Everywhere" was the chief inscription on the earlier maps, but since the amalgamation with the London Undergronnd Railways in 1912 that legend has given place to "Covers London and Extra London." On the reverse side of the folder when opened, however, there appear the words "The Heart of London Served by and half-holidays. The longest route is now the one between Charing Cross and South Harrow Station, the journey over which takes 136 minutes. A close study of the map will reveal the fact that there are many routes still open to omnibus service. It is only lately that the route from Victoria Station over Westminster Bridge has been opened, although this was one of the first to be started. The present route taken from the east end of Westminster Bridge is *via* Stamford Street and over Blackfriars Bridge to the Bank, whereas it might very well have been taken down Southwark, and so have formed the much-required link between the Blackfriars Road and Tooley Street. Another useful gap which might be filled is that between Victoria and King's Cross. It is also remarkable that on the great arterial road between "The Plough" and "The Elephant" there was until this month only one service (48) between "The Swan" and "The Horns," and another (34) between Kennington Gate and "The Elephant." There is evidently no limit to the expansion of the business. A feature introduced within the last few months is the issue of return tickets on some of the routes, which, however, unlike those on tramways of London, are not available for a return journey by other services.

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MOTOR TRAFFIC.

SOME LEYLAND TYPES.

The illustrations of some of the machines recently delivered from the works of Leyland Motors, Limited, at Leyland in Lancashire, which are shown on this and the following page give a good idea of a few of the heavy types which are deservedly popular with those interested in the public service side of mechanical transport. Established in 1895, the Leyland works have grown rapidly year by year, so that to-day the firm enjoys the distinction of being the leading manufacturers both of the steam and the petrol types of vehicles. The present works now cover an area of some 13 acres and give employment to upwards of 1,000 men. Considerable extensions are, however, still being made in order to cope with the constantly increasing business.

A special feature in the design of Leyland chassis is accessibility. Large inspection covers are provided in the crank case giving easy access to the big ends, and large covers are fitted both to the gear box and to the back axles. All parts of the chassis are machined to jigs; replacements are therefore strictly interchangeable. This applies to all types of machines. The furniture van which forms the subject of the illustration below is one of a number supplied to Messrs. Waring and Gillow, and is in almost constant service with a trailer as shown. The chassis is designed for a load of five tons and is fitted with a standard 4-cylinder 40-H.P. engine. The frame is of pressed nickel steel 7⅞ in. deep by 2½ in. wide, with an overall length of 23 ft 8 in. The road wheels are hollow spoke steel, the front having ball bearings and the back a gun metal floating bush. The transmission is on the central thrust principle with the "Leyland" patent spherical bracket. The gear box provides for four speeds and a reverse, direct on top, with gate change. The back axle consists of a drop-stamped steel beam carrying the load through underhung springs and supporting a steel axle casing containing the gears. The power is transmitted through the propeller tube to a bevel which is mounted on the differential on a lay shaft, and from each side of the differential by spur pinions to spur wheels on the internal driving shafts, gearing with the outer faces of the road wheels. The wheel base is 14 ft. 10 in.

The 6-ton steam wagon is the Leyland standard, and complies with the Local Government Board regulations; it is extensively used by municipal authorities for street cleansing purposes. The engine is fitted with two high-pressure double-acting cylinders, 4½ in. diameter by 6 in. stroke. All the moving parts and change speed and reversing gear are contained in one oil-tight casing. The valves are of the poppet type separate valves being provided for inlet and exhaust; these are actuated by rocking levers from the horizontal cam shaft which is placed on the top of the cylinders. The boiler, which owing to the absence of stays is both light and accessible, is fed by a pump geared to the crank shaft of the engine and capable of being used when the engine is running or standing. There is also an automatic injector having a separate suction from the water tank. Ordinary gas coke is the fuel used, while the water is carried in a galvanised iron tank with wash plates carried in an oak cradle; this has a capacity for from 10 to 18 miles, according to the nature of the service. On good macadam or paved roads where the gradients do not exceed one in nine this machine will take a trailer with a 4-ton load in addition to the six tons on the wagon. The motor's over-all length is 20 ft. 5 in. The Leyland 4-ton chassis is also fitted with the standard 40-H.P. engine and closely resembles the 5-ton machine; the tare weight, however, is 3 tons 16 cwts., as against the 4 tons 2 cwts. in the case of the larger vehicle.

The 40-H.P. X type shown with a 1,000 gallon water tank body, and a 4-ton tipping wagon is specially designed to give a long platform, the driver's seat being placed over the engine. These are known as the "Over type" and in the main features follow the Leyland standard

A Leyland 5-Ton Lorry and Trailer Employed on Long Journeys.

practice. The bodies shown in the illustrations are interchangeable. The motor fire engine department of the Leyland business has increased very rapidly since the first machine was delivered to Dublin some five years ago. Our illustrations include the standard 55-H.P. 4-cylinder machine built for the Southport Corporation, which is designed for service in towns of moderate size, and also the 6-cylinder 85-H.P. large fire engine which has a capacity of 850 gallons per minute with a 10 ft. lift. Both these machines are fitted with Rees Roturbo pumps, the larger size having four automatic delivery valves and the smaller engine three.

The Leyland Company claim that the high-speed pump with gear is more economical than a slower pump direct driven, and have therefore adopted the single gear between the engine and pump and the direct drive to the axle as being the most efficient and quickest road transmission. With the exception of the smallest size, the 3-ton gear-driven chassis with central pivot steering is used for each type of fire engine, the standard practice being followed with one or two minor modifications. It is worthy of note that, following the most exhaustive trials of the fire engines already in service, Leyland Motors have been awarded a large repeat order from the London County Council.

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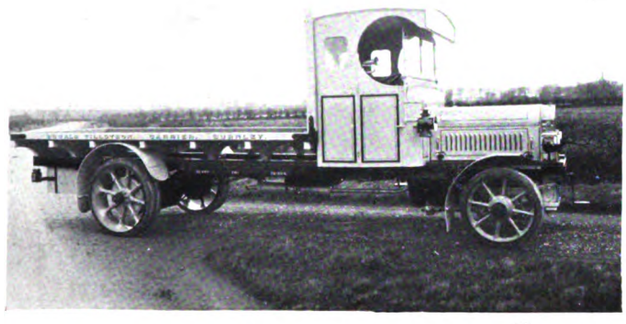
40-h.p. 4-Ton Watering Machine—Bury Corporation.

Vacuum Extractor for Emptying Street Gulleys.



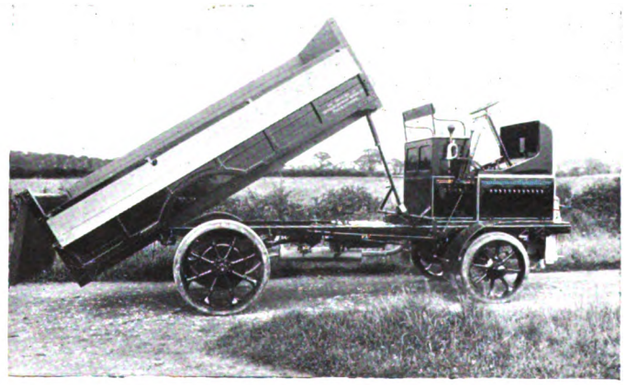
4-Ton Lorry.

6-Ton Steamer which Hauls 4 Tons on Lorry.

6-Cylinder 85-h.p. Fire Engine.

4-Cylinder 55-h.p. Fire Engine.

Municipal Wagon Fitted with Interchangeable Refuse Body.



40-h.p. 4-Ton Tip Wagon.

SOME LEYLAND TYPES

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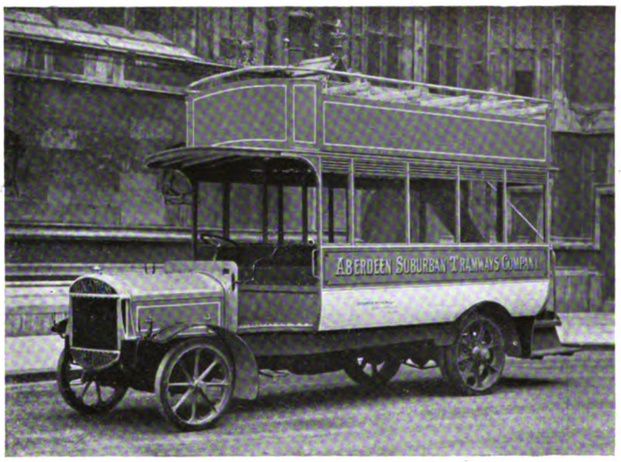
MOTOR TRAFFIC.

TILLING-STEVENS OMNIBUSES FOR ABERDEEN.

UNTRAINED DRIVER TAKES CHARGE FROM LONDON TO THE GRANITE CITY.

The record for long distance omnibus journeys is easily held by the petrol-electric vehicles manufactured by W. A. Stevens, Limited, of 26, Victoria Street, London, and Maidstone. In past years omnibuses for Liverpool and Newcastle-on-Tyne have been taken to their destinations by road, and now Mr. Alex. Wilkie, the manager of the Aberdeen Suburban Tramways Company, has eclipsed those distances by many miles in accepting delivery of three omnibuses made for the company by W. A. Stevens, Limited.

It was not Mr. Wilkie's intention, however, to have engaged in the tour, which was forced upon him by the inability of a steamship company to ship the vehicles to Aberdeen. Incidentally the journey by road had a three-fold result. First, the manager became an enthusiast for the petrol-electric system of traction. Secondly, the trip demonstrated the ease with which one of his employees, who was altogether unacquainted with petrol-electric traction, was enabled to drive one of the omnibuses for the greater part of the distance, after a day's observation of the method of procedure. In the third place the journey gave the Tilling-Stevens machines a splendid advertisement among tramway managers. Mr. Wilkie was three nights on the road, but did not travel after dusk. In seeking a place of shelter for the two vehicles



40-h.p. Tilling-Stevens Omnibus En Route from London to Aberdeen.

he naturally turned to the tramway managers. These gentlemen were most obliging in offering room in their depots.

The feature of the illustration of one of the omnibuses given on this page is the roominess afforded by the special design of body with which the chassis has been fitted. This design was evolved by Mr. Ellison, of the Eastbourne Corporation omnibus department, and he has given W. A. Stevens, Limited, the privilege of using it. The first example of an omnibus so fitted was exhibited at the Commercial and Industrial Motor Vehicle Show at Olympia in July, 1913. At first sight the chassis and lower deck would appear to be nearer to the ground than usual, but this effect is due to the rocker panel being put in square. The seats on both decks face the driver's back, and in the saloon a wide gangway is available. Twenty seats are provided in the interior, and 18 on the top deck, and there are also seats for two passengers by the side of the driver, thus accomodating 40 passengers in all. The lower deck seats are on springs, and are upholstered in leather. J. Liversidge and Son, Limited, Old Kent Road, London, were the builders of the bodies, which are decorated in similar colours to the Aberdeen Suburban Tramway Company's cars.

Our readers are well aquainted with the details of the petrol-electric system of traction adopted with these chassis, and it will suffice to mention that the engines are of 40 H.P. The journey was accomplished at an average speed of 20 miles an hour. The numerous hills were negotiated with ease, and the running was very smooth. London was left at 10 a.m. on Sunday, May 31, and Aberdeen was reached at 8-30 p.m. on the following Wednesday. The runs were: First day, 140 miles, Barnby Moor, Warwickshire; second day, 160 miles, Gateshead; third day, 118 miles, Edinburgh; fourth day, Aberdeen.

At Gateshead Mr. Wilkie received a welcome from Mr. W. Morrison, the general manager of Gateshead and District Tramways Company, who housed the omnibuses on his premises. Mr. Morrison, who is an Aberdonian, was for some years travelling manager of the British Electric Traction Company, and he expressed his pleasure at one of his townsmen being the first to take beyond the Border the best omnibus now on the market.

The third omnibus was delivered during the second week in June, and a regular service has been started between Bieldside and Culter together with special runs to various places such as Banchory, Ballater, Balmoral, and Braemar. These pleasure trips take place on Wednesdays, Saturdays, and Sundays, and on holidays. Picnic and outing parties are also being catered for.

It is of interest to note the impression that Mr. Wilkie has formed of the traffic war in London as the result of his visit. To the local newspaper representatives he stated: "This year the London County Council has had to take nearly £100,000 out of reserve to pay for current charges. They have advertised along the side of their tramcars inviting ratepayers to use their own cars in preference to 'buses, but alas! the advertisements are appealing to blind eyes and dull ears, the 'buses being crowded."

DENNIS SINGLE-DECK OMNIBUS.

Municipal traffic officials and others responsible for the working of public service vehicles will be interested in the accompanying illustration of a somewhat novel type of single-deck omnibus constructed by Messrs. Dennis Brothers, of Guildford, for Messrs. T. Standen and Sons, of Sittingbourne. The machine shown forms the sixth repeat

Dennis Omnibus Seating 33 Passengers.

order which Messrs. Dennis have received from the same firm. The entrance, as will be seen from the photograph, is through double doors under cover at the rear of the body on the near side. These doors open outward, and this arrangement prevents waste of space and enables the car to accommodate no less than 33 passengers in a single-deck body of reasonable dimensions.

AUTOCAR IMPERIAL YEAR BOOK.

From the office of the "Autocar," Tudor Street, London, E.C., has been issued the "Autocar Imperial Year Book" (2s. 6d.), which is intended for sale in the Colonies and abroad. The contents have been revised throughout and many new features added. Special attention has been given to electric lighting systems and electric engine starters, all the principal makes at present on the market being described and illustrated. The book opens with a critical review of modern motor car design, both as regards the chassis and the coachwork. This is followed by "The Autocar Buyers' Guide," which contains particulars of practically all the cars at present on the British market together with the prices—both chassis and complete car—ruling in Great Britain. A table of freight charges and import duties comes next, and it enables, with the Buyers' Guide, an intending purchaser to obtain a very close approximation of the cost of any car in any part of the world, whether it is bought through local agents or direct from England. There are many other useful features in this useful volume, which can be obtained from booksellers throughout the Dominions and Colonies.

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MOTOR TRAFFIC.

HEAVY TRAFFIC AND ROAD COSTS.

GOVERNMENT PROMISES TWO INQUIRIES.

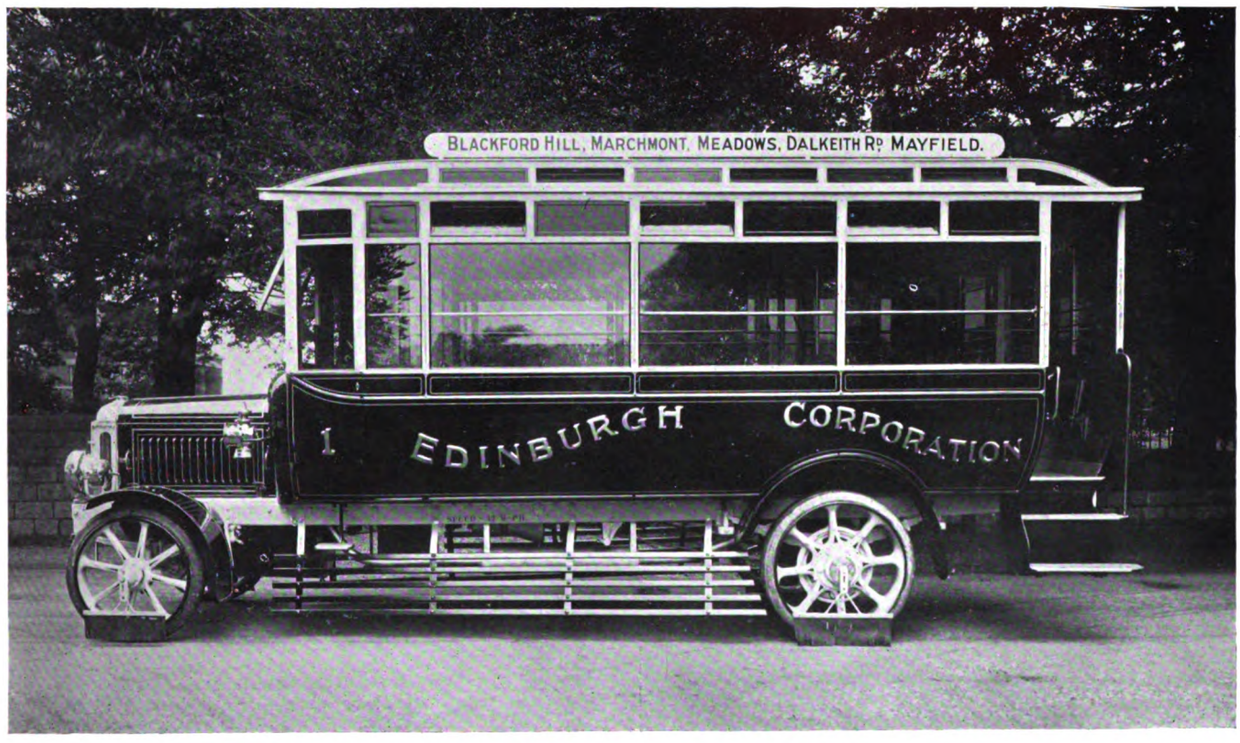
The County Councils Association, the Urban District Councils Association, and the Rural District Councils Association appointed representatives to form a deputation which on July 1 waited upon Mr. Herbert Samuel, President of the Local Government Board, to urge amendment of the law relating to heavy road motor vehicles and particularly in regard to contributing to road maintenance.

The members of the deputation who spoke put forward the claim that an adequate licence fee should be paid in respect of heavy motor cars and traction engines, the proceeds to be distributed among road authorities on an equitable basis. It was also asked that legislation should be passed to make the proprietors of all trackless trolley cars and motor omnibuses liable to contribute towards the maintenance of the roads over which they run, and to give power to road authorities to regulate the running of such vehicles over their roads.

Mr. Herbert Samuel, replying, said that so far as heavy motor cars were concerned a Departmental Committee ten years ago held an inquiry with respect to regulations relating to weight and other technical questions, and the last inquiry as to traction engines took place 16 years ago. Since then there had been a great development in every way. He agreed that the time had come again to review this matter. Not only should the vehicles be required to adapt themselves to the reasonable requirements of the road authorities, but the latter were also liable to adapt their roads, and this they recognised. He proposed that this question should be again considered by a technical committee, both as to regulations which could be altered and as to amendments of the law which had become necessary. As regards cost, he agreed that there was a general sense of injustice that these vehicles which did so much damage did not contribute more towards the cost of the roads which they damaged. He recognised the just indignation of the small trader at the stream of vehicles which lessened his profits and increased his rates. Parliament had not been indifferent to this, and had levied taxes on motors and petrol. It was true, however, that these heavy motors paid no licence duty and only half the petrol tax. The deputation had made out a strong case for calling on these vehicles to pay a larger sum, and the proceeds disbursed to the local authorities. But whatever was done, let them not go back to the principle of the toll-bar. This was a matter for the Chancellor of the Exchequer and could hardly be added to the Budget for this year. He hoped, however, that the time was not far distant when the wishes of the deputation would be met to some degree. The question as to motor omnibuses and trackless trolley cars running over definite routes had been before a number of Parliamentary Committees. The position was not satisfactory, and no uniform rule had been adopted, and where a service was run by a company not requiring statutory powers, nothing was payable. This was not a matter which could be dealt with by a Government department. It rested with Parliamentary Committees, and no doubt they would be glad of some guidance. Probably the requirement upon bodies needing statutory powers should apply to other bodies. He thought some tribunal should inquire into this, other than a committee inquiring into regulations as to weight and so forth. He therefore proposed to suggest that a Joint Select Committee be appointed this session to inquire into these matters and to report to Parliament, and he had reason to think that that course might be acceptable to the authorities.

LEYLAND OMNIBUSES FOR EDINBURGH.

The first single-deck omnibus for Edinburgh was delivered by Leyland Motors, Limited, to the Corporation early in July. As will be seen from the accompanying illustration, it is a fine model, and it is the latest Leyland type both as regards the design of the chassis and body. The rear axle, which is of the latest Leyland pattern, is worm driven, and the engine has a capacity of from 30 to 40 H.P. The entrance to the body is at the rear, but an emergency door is provided at the front, the key for which is kept in the driver's locker. The body has two compartments, one for smoking and the other for non-smoking passengers. Exclusive of the driver the vehicle has a capacity for 29 passengers. The roof is of the clerestory type, giving ample head room and thorough ventilation. The machine is fitted with a complete dynamo lighting set, as will be seen from the illustration. Splash-guards and life-guards are also provided.



Leyland Omnibus for Edinburgh Corporation.

MANCHESTER'S OFFER OF A ROAD CONTRIBUTION.—At the June meeting of the general committee of the Commercial Motor Users' Association, attention was drawn to a proposal in the Manchester Corporation Bill, 1914, to pay 2d. per mile run to certain local authorities in respect of projected motor omnibus services.

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MOTOR TRAFFIC.

EASTBOURNE TO LAND'S END.

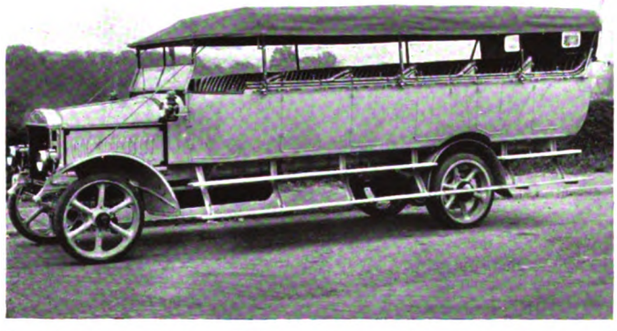
DENNIS CHAR-A-BANCS INAUGURATES A NEW DEVELOPMENT.

The accompanying photograph illustrates a 30-seat Dennis motor char-a-bancs, which is being employed by Messrs. Chapman and Sons, of Eastbourne, during the present season for a particularly interesting and original class of work; that is to say, long-distance trips covering

Dennis Char-a-Bancs Running from Eastbourne to Land's End.

the best part of a week. The first of these journeys started on Whit-Monday and was successfully completed on the following Saturday evening. During the week the char-a-bancs ran with a full complement of passengers from Eastbourne to Land's End, and back by a different route, over a total distance of 660 miles. Seats were let at a moderate inclusive charge, comprising a week's motoring, first-class hotel accommodation and all meals. The passengers expressed themselves thoroughly delighted with their journey.

Long motor rides are popularly supposed to be very tiring, and it therefore speaks well for the great comfort afforded by this car from the Dennis works at Guildford, that the oldest of the passengers, a lady of about 70, was able to say that she felt much the better for the trip and was not in the least tired at its conclusion. It is high testimony to the reliability of a vehicle of this kind when its proprietor is prepared to book it for the whole of the summer season for long trips. Such journeys would inevitably show considerable loss if the machine employed lacked perfect trustworthiness or failed to attract custom by any fault in respect of comfort or smooth running.



Dennis Char-a-Bancs with One-Man Hood and Folding Steps.

Messrs. Chapman have advertised their intention of running alternate trips from Eastbourne to Land's End and to Llandudno throughout the summer. In each case the car must pass through districts where hills are long and steep. With the right vehicle under the right management there is every prospect that the experiment will prove a notable success. There is already some talk of more extended trips to Ireland next year.

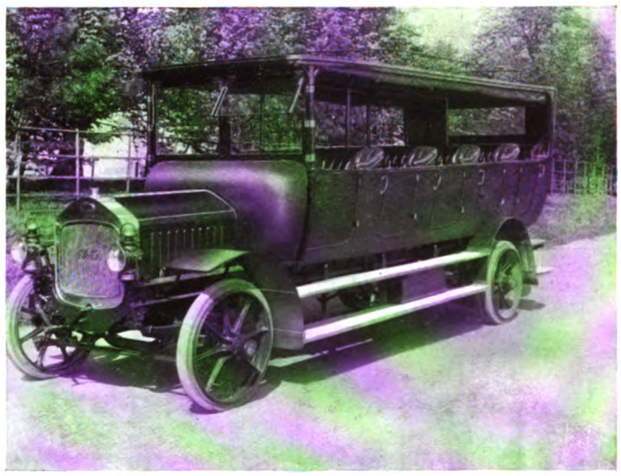
As regards the equipment of the car, the finish and upholstery are, of course, of the highest class. A Cape cart hood provides protection from weather, and ample luggage accommodation is secured by utilising the space beneath the seats, and also, as seen in the photograph, by fitting a substantial luggage compartment beneath the rear of the body. Messrs. Chapman would no doubt have hesitated to make this experiment had they not already proved to their own satisfaction the reliability of the Dennis machines, of which they now own five, the majority of which were in service during last summer season.

REPEAT ORDER FROM SOUTHSEA.

The second photograph depicts a 30-seat Dennis char-a-bancs supplied to the third repeat order of the Southsea Tourist Company. This car is fitted with a one-man hood and folding steps. When the car is loaded the steps are folded up, the underside carrying the name and address of the proprietor. The Southsea Tourist Company purchased their first car from the Guildford works 15 months ago, and have obtained excellent results, as indicated by the fact that the present vehicle is the third repeat order, since which still further orders have been placed.

ALBION CHAR-A-BANCS FOR SCOTTISH TOURING.

It is not surprising to learn that Albion vehicles are largely used for pleasure traffic in Scotland, the land of their manufacture. The Albion chassis owing to its smooth running qualities is eminently suitable for public service work. When to this chassis is fitted a superbly finished and luxuriously upholstered body one gets all that is desirable in a motor char-a-bancs, in fact Albion chars-a-bancs are quite as comfortable as many pleasure cars.



The above photograph depicts a handsome Albion char-a-bancs fitted to a 25-H.P. chassis, and having a seating capacity for 24 persons exclusive of driver. This vehicle was supplied to Messrs. J. and J. Scott, Posting Masters, Dumfries.

DAIMLER OMNIBUSES FOR TURKEY.

Motor omnibuses from Coventry are already running in Turkey and the Crimea, and a further eight 40-H.P. Daimler double-deck motor omnibuses are on board the Cunard steamer "Tyria" which recently sailed from the Mersey for delivery at Constantinople and Theodosia. The immense cases containing the vehicles aroused much speculative interest as to their contents, as they stood on the dock side at Liverpool. With the aid of a floating crane they were safely lifted on to the Cunarder, and the special arrangements made for below-deck stowage were, in view of the massive bulk of the shipment, most gratifying. The Cunard freight steamers which take cargo for Italian, Adriatic Levant, and Black Sea ports, are well adapted for loading cargo of this description under deck.

COVENTRY CHAINS.—The Coventry Chain Company, Limited, Coventry, have received an intimation from a customer in Staffordshire that a pair of "The Coventry" roller chains were fitted on a 3-ton Halley motor lorry, and have given every satisfaction, having completed 20,600 miles.

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MOTOR TRAFFIC.

OMNIBUSES IN MUNICIPAL SERVICE.

OPINIONS OF TRAMWAY MANAGERS.

Mr. H. Parsons, A.M.I.Mech.E., read a paper on "Motor Omnibuses in Southampton Traffic" before the Southampton Chamber of Commerce on May 26. He stated that the object of the paper was to endeavour, by disseminating information and by drawing attention to what other boroughs were doing, to stimulate interest in what to his mind was a quicker, more convenient, and more flexible passenger vehicle, the motor omnibus. It was not his desire to advocate scrapping the tramways and ordering a fleet of omnibuses, for, indeed, such a suggestion would show that he was not fit to read his paper. It seemed rather a case of running the omnibus and the tramcar together for a while, the one helping the other, and it would not be long before the public decided which was the better.

A good many persons imagined that it was only in London that the motor omnibus had any vogue, but there were dozens of towns that had adopted omnibuses. He had to express his indebtedness to the engineers and managers of various undertakings with whom he had been in communication for generously affording him information regarding their services.

AS FEEDERS AT LIVERPOOL.

Mr. Parsons proceeded: "'The general manager of the Liverpool Corporation Tramways has written to me, and I extract the gist of his remarks: 'In Liverpool we have for some time used motor omnibuses to feed our tramways from one outlying suburb, and this effort has met with satisfactory financial results, and we are about to install a further service, connecting two suburbs together which have hitherto been only individually equipped with tramway facilities, and we are hoping this connecting link between the two main lines may develop a satisfactory traffic, with resulting financial benefit to the department, and increased convenience to the travelling public. There are also several other connections between existing tramway routes which it is proposed to couple up by motor 'bus services.' The experience, has been satisfactory from a financial point of view, but comparative results cannot satisfactorily be supplied at the moment, though a copy of the annual report of the general manager is available for those who wish to see it.'

WORKED AT A REASONABLE COST AT SHEFFIELD.

"Turning to Sheffield, the general manager tells me they are working five omnibus routes in the city in connection with their tramways, and find the 'buses of great assistance on routes which are not sufficiently well populated to warrant the construction of tramways. He says: 'On other routes where there is intermittent pleasure traffic, and as extensions to tramway routes out in the country district, 'buses are used. The stock is being increased, as they are found to be worked at a reasonable cost and are appreciated by the public. Comparative financial results are not yet complete, but will be shortly. A weakness of the motor omnibus is its limited carrying capacity, as during the winter this is only one-fourth the comfortable carrying capacity of the tramcar. Fares are somewhat higher than for the tramcars. The difficulty here, as in other places, is to arrange for cover for the vehicles on the top deck in winter.'

WOLVERHAMPTON MANAGER A STRONG ADVOCATE.

"Coming to Wolverhampton, the general manager writes that they have two services running in connection with the tramways, and a third route has just been opened. The vehicles operate to residential suburbs where the traffic does not warrant a tramway service, owing to the large capital cost. The type of 'bus in this case is single deck, to seat about 26 passengers, with front entrance. The figures for the past financial year ending March 31 are not available, but for the previous year the cost per mile run, including depreciation at 20 per cent., was 8·1d. per mile, or, including depot accommodation, rates, general management, etc., say, 9d. per mile. (The figures for the past year—8·455d.—appear elsewhere in the present issue of this journal.) The general manager states he is a strong advocate of omnibuses as adjuncts to the tramway undertaking, and in Wolverhampton they are very much appreciated by the public, besides which they are a source of extra profit to the department. The object in adopting a small 'bus of the single-deck type is that accommodation for 24 to 26 passengers during the greater part of the day is ample in conjunction with a 15 minutes to 30 minutes' service. With the vehicles in use in Wolverhampton it is possible for the windows to be removed in the summer time.

"GREAT FEEDING VALUE" AT NEWCASTLE.

"At Newcastle-on-Tyne, the engineer and general manager reports that omnibuses are operated on one route—to a colliery village some two and a half miles from an existing tramway terminus. Only one omnibus is used on weekdays, and three on Saturday. He states, however, that the receipts on this route are approximately 10d. per mile, and the working expenses on a five-year basis 9½d. per mile. It has a great feeding value to the tramway, in conjunction with which it runs.

"Taking Birmingham next, the general manager informs me they are running a fleet of 10 omnibuses as an extension to one of their tramway routes, but it is too early yet to get reliable figures, though correct records are being kept."

Mr. Parsons went on to enumerate what he conceived to be the advantages of omnibuses as compared with tramcars. Among his contentions was one that as tramway rails were the cause of so many road repairs it followed that if they were not present roads would last much longer. The rubber tires of omnibuses could be hardly said to wear the roads at all where paved, and on unpaved roads the road foundation must be put right, for which it seemed that some Government help might be forthcoming. In the matter of speed the omnibus could always beat the tramcar, for the reason that it was mobile. There was also a great advantage that if a road was under repair an omnibus could deviate and join the road again. On tramways there were frequent law actions arising from the state of the rails, and this expense would be saved in the case of omnibuses.

Adverting to the question of road maintenance, he contended that in London the laying of stronger roads had resulted in an extension of their life, according to the Fulham surveyor, at least 20 to 25 per cent. Money was also being saved on cleaning. He suggested that it was now time to reconsider the matter of camber of paved roads in towns. He trusted that town councils and the officials concerned would give careful attention to this transit and traffic problem, and that the inhabitants would realise what competing places were doing, and offer the same advantages, for a reputation as a progressive community was one of the best assets any town could possess from a commercial point of view.

SHEFFIELD OMNIBUSES AND ROAD MAINTENANCE.

AN IMPORTANT DECISION.

The question whether motor omnibuses worked by a municipality and running partly on roads in adjoining county areas should contribute to the cost of maintenance of the county roads has recently been decided in the affirmative by more than one Parliamentary Committee, and it was part of the subject dealt with by the deputation that recently waited on the President of the Local Government Board, which is referred to in another column. The point has within the last few weeks been hotly contested again in connection with the Sheffield Corporation Bill, which came under the consideration of the Local Legislation Committee of the House of Commons presided over by Mr. Middlebrook. The Corporation sought by the bill to obtain powers to run omnibuses over additional routes, and they objected to be put under special obligations to the County Councils concerned. Much evidence was heard, and the views of the parties were well summed up in the following abstract from the closing speeches of counsel, which were delivered on Wednesday, June 24.

Mr. Wedderburn, for the West Riding County Council, maintained that no case had been made out for the repeal of the provision contained in the Act of 1907, under which Sheffield obtained power to run motor omnibuses, subject to the consent of the local authorities. The County Council asked, with regard to the new routes, that a similar provision should be inserted, and that the routes should not be used without the consent of the local authorities. The Corporation said they only asked to be put in the same position as the private owner, but, as a matter of fact, they were asking to be put in a much better position, because if the bill passed as it stood they would be exempt from any liability with respect to any damage they might do to the roads. They would be exempt from the provisions of the Extraordinary Traffic Act. One municipal body had no right to make a profit at the expense of another municipal body. He asked the Committee to say that if Sheffield came outside their own district for purposes of profit they must do so at their own expense, and not at the expense of the County Council.

Mr. Ram, for Derbyshire County Council, said that Sheffield proposed to take the whole of the profits of the traffic, and the whole of the cost of repair of the roads was to be borne by the county. It was extremely difficult to say what the amount of the contribution should be. Evidently three-eighths of a penny per 'bus-mile was wholly inadequate, and he suggested that some scheme should be devised for ascertaining the actual cost of the repair of the roads, and that the contribution should be subject to revision every three years.

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MOTOR TRAFFIC.

Mr. Vesey Knox, for the Corporation, said all the promoters asked for was that they should be allowed to extend a successful and well-managed business, which had proved a great advantage to Sheffield and the surrounding district. What the opponents were asking for when they urged that a contribution should be imposed on Sheffield was a reintroduction of the old turnpike system.

The Committee postponed their decision in order that they might have ample time for consideration, but on Wednesday, July 1, they announced their conclusion.

THE CITY TO CONTRIBUTE TO COUNTY ROAD MAINTENANCE.

The chairman, in intimating the decision to the Committee, referred to the great complexity of the question and the variety of interests concerned. The complexity had been aggravated by the announcement made by the President of the Local Government Board that a Joint Committee of both Houses of Parliament was to be appointed to consider the whole problem of whether contributions to road maintenance should be paid by the owners of motor omnibuses and trackless trolley cars. The Committee, however, could not wait for that, but must give their decision as best they could. They would sanction four of the seven omnibus routes proposed by the bill, these four all going outside the city boundary.

On the question as between Sheffield and the opposing County Councils, he said it was almost impossible to put into figures, apart from the question of deciding the principle whether there should be any contribution or no contribution, what would represent for the present and for a considerable period in the future, any adequate payment for the additional wear and tear which would follow on the omnibus traffic. The Committee had, however, come to the conclusion that Sheffield should contribute ¾d. per omnibus-mile, that figure to be subject to revision either by agreement between the parties or in the event of failure to agree, by arbitration at intervals of three years. The view of the Committee was that the Corporation should contribute after the first three years, in the event of arbitration, 50 per cent. of such amount as the arbitrator might decide to be the extra cost of up-keep of roads due to the motor omnibus service. As to whether any Imperial grant should be taken into account in arriving at the amount which the Corporation should contribute, he said that in the view of the Committee, if such a grant should amount to one-quarter of the total cost of upkeep, the contribution of Sheffield should then be only one-half of what might be found to be the figure in the absence of any Imperial contribution. In the event of the State grant amounting to one-half the cost of maintenance, Sheffield's contribution would cease. The Committee would suggest in their report that Parliament should lay down a general principle to apply to the whole country.

MOTOR OMNIBUS RESULTS.

We append summaries of the motor omnibus accounts recently issued by the tramway departments of Birmingham and Wolverhampton.

BIRMINGHAM CORPORATION MOTOR OMNIBUSES.

July 9, 1913, to March 31, 1914.

	£	£	Aver. per mile run. d.	d.
RECEIPTS:				
Traffic	6,761			
Sundry	14			
		6,775		12·357
EXPENDITURE:				
Petrol	1,407		2·566	
Superintendence	197		·360	
	1,604		2·926	
TRAFFIC EXPENSES:				
Wages of drivers and conductors	1,199		2·187	
Cleaning and oiling	279		·509	
Fuel, light, water, etc.	129		·236	
Ticket check	30		·055	
Uniforms	47		·086	
Miscellaneous	33		·059	
	1,717		3·132	
GENERAL EXPENSES:				
Rents, rates, and licences	278		·507	
Printing and stationery	27		·050	
Law charges & compensations	1		·002	
Insurances	20		·036	
Miscellaneous	7		·013	
	333		·608	
REPAIRS AND MAINTENANCE:				
Buildings and fixtures	7		·013	
Workshop tools, etc.	42		·075	
Rolling stock—wages	347		·633	
" " materials	493		·900	
Tires	549		1·000	
	1,438		2·622	
Total		5,092		9·288
Balance		1,683		3·069
Percentage of operating expenses to total revenue				75·16%
Average operating expenses per 'bus-mile (excluding petrol cost)				6·722d.
'Bus-mileage				131,590
Passengers carried				748,500
" " per 'bus-mile				5·69
Average fare per passenger				2·18d.
Operating expenses per passenger				1·63d.

WOLVERHAMPTON CORPORATION MOTOR CHARS-A-BANCS.

Year ended March 31st, 1914.

	£	£	Aver. per mile run. d.	d.
TRAFFIC RECEIPTS		2,071		10·244
EXPENDITURE—Operating costs:				
Petrol	338		1·671	
Wages of drivers and conductors	420		2·074	
" Oilers and cleaners	50		·250	
Oil, grease, and sundries	31		·154	
Tickets, way bills, etc.	6		·029	
Uniforms	13		·067	
Miscellaneous	6		·029	
	864		4·274	
GENERAL CHARGES:				
Licences	11		·054	
Insurances	45		·224	
Printing and stationery	4		·018	
Miscellaneous	4		·021	
	64		·317	
MAINTENANCE, REPAIRS, ETC.:				
Chassis	187		·926	
Bodies	82		·404	
Tires	243		1·202	
Depreciation of chars-a-bancs	235		1·164	
	747		3·696	
			8·287	
Bank interest	30		·148	
Total		1,705		8·435
Balance		£366		1·809
Percentage of operating expenses to total revenue				80·88
Average operating expenses per 'bus-mile (excluding petrol cost				6·616d.
'Bus-mileage				48,511
Passengers carried				428,704
" " per 'bus-mile				8·84
Average fare per passenger				1·16d.
Operating expenses per passenger				·939d.
Number of chars-a-bancs				4

MONTREAL OMNIBUS LITIGATION.

An appeal is to be made to the Supreme Court of Canada in the case of the Montreal Tramways Company against the Canadian Autobus Company, who propose to provide the city with an omnibus service, using similar chassis to those of the London General Omnibus Company. The appeal is from the judgment of the Court of King's Bench, upholding the decision of Mr. Justice Demers, who held that all the proceedings the company had had with the City Council and the Board of Control with regard to the inauguration of a motor omnibus service were regular and legal.

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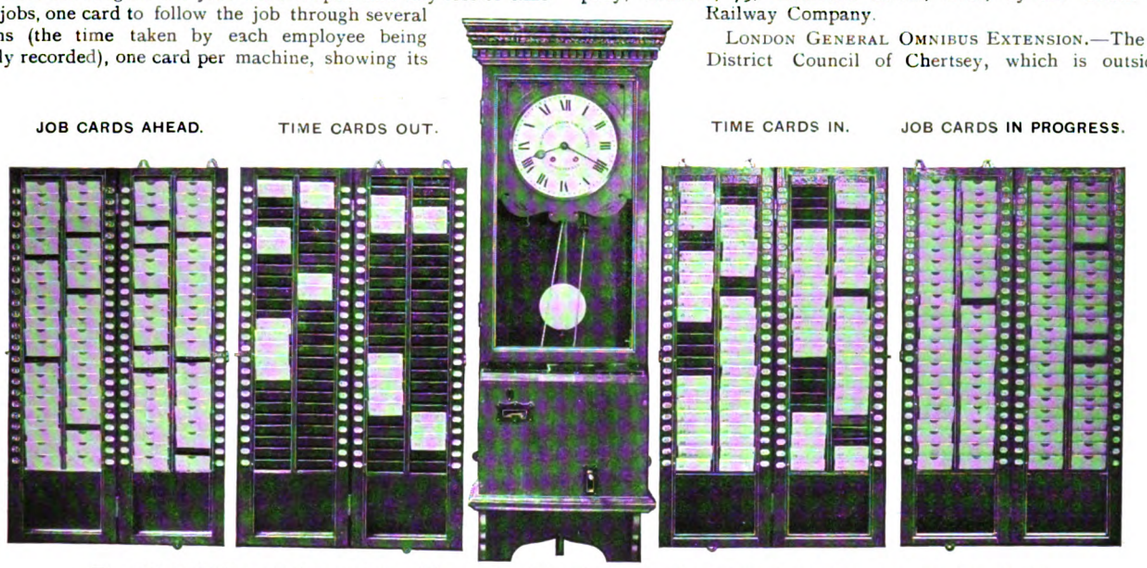
MOTOR TRAFFIC.

JOB COSTING BY TIME RECORDER.

For securing accurate costs of production together with efficient time checking, the Gledhill-Brook recording system appears to be rapidly finding favour both in the workshop and in the time office. At the recent Printing Trade Exhibition we had an opportunity of examining the various machines which the Gledhill-Brook Time Recorders were exhibiting on their stand, and where Mr. Frank Brook, the inventor of the automatic check machine, gave some particulars of the wide possibilities of their system and the ease with which it can be adapted to any class of business. It is now 23 years since Mr. Brook made his first attempt to control workpeople's time by clockwork, and it is by a gradual process of evolution that the present state of perfection has been obtained. For time checking the system allows the day's totals to be carried out day by day, each person's time card being therefore ready for payment at any time, including all bonuses premiums, etc.

It is, however, in connection with job costing by clockwork that the greatest advance has been made, and so elastic is this system that any or all of the following methods of working can be adopted at one and the same time and with one recorder, viz.: One card one job, one card for each operation, several jobs on one card, one card for each man per week showing all the jobs worked upon and any loss of time between jobs, one card to follow the job through several operations (the time taken by each employee being accurately recorded), one card per machine, showing its output, so that if a man attends half a dozen automatic machines he has a card for each, which gives the time taken both for setting up and doing the work. All the operations on one machine for a week can be also recorded on one card, thus showing the weekly output and the number of hours the machine has been running and the cost of production.



The Gledhill-Brook Recorder, with a set of Card Racks, for Time Keeping and Job Costing.

As will be seen from the accompanying illustration, the job costing equipment consists of the recorder and a set of card racks. It is not necessary, however, that the card racks should be placed exactly in the same position as shown, as frequently the job cards are kept in the foreman's or cost clerk's office.

In workshops where there is both piece-work and day-work, differently coloured cards are provided, so that the superintendent or foreman can see at a glance, as he passes the card rack, exactly the nature of the job upon which the men are working. The job card can also be used for recording the issue of material so that the whole cost of the job can be immediately ascertained on completion.

Amongst the many firms who have installed this system in their new works may be mentioned W. A. Stevens, Limited, Maidstone.

AVON RUBBER COMPANY APPOINTMENTS.—The Avon India Rubber Company, Limited, have appointed Mr. W. Bray (late of the Shrewsbury and Challiner Tire Company) as their solid tire representative for Cheshire, North Wales, and part of Lancashire, and Mr. Chas. H. Holgate as their representative for Yorkshire. These appointments follow on two others recently made for the London district, viz., Mr. M. Elliot (late of the K.T. Tire Company) and Mr. W. F. Walden (late of the Sirdar Rubber Company).

MOTOR TRAFFIC NOTES.

BRIGHTON TOWN COUNCIL have authorised the electrical engineer, Mr. John Christie, to obtain an electric vehicle at a cost of £200.

MESSRS. GRENSHAW AND PEERS, of Bolton, have received a contract from Southend Council for three electrically-driven coal wagons.

ALBION MOTOR CAR COMPANY have received an order from West Bromwich Corporation for four 25-H.P. Albion chassis with a seating capacity of 24 passengers each.

MOTOR CABS FOR RANGOON.—In consequence of the popularity of the motor cabs now in service the Rangoon Taxi Cab Company are providing 60 additional vehicles.

ELECTRIC VAN FOR POPLAR.—The Borough Council have decided to purchase a light electric van or wagon for the use of the electricity undertaking, at a cost not exceeding £200.

BURNLEY AND OMNIBUSES.—The Tramways Committee have called for a report on the advisability of running motor omnibuses on a number of routes throughout the borough.

MOTOR RAIL COACHES FOR INDIA.—An order for three 70-seat rail motor coaches has been given to the Motor Rail and Tramcar Company, Limited, 79, Lombard Street, E.C., by the South Indian Railway Company.

LONDON GENERAL OMNIBUS EXTENSION.—The Urban District Council of Chertsey, which is outside the Metropolitan Police district, have granted licences for 10 double-deck omnibuses and six single-deck to the London General Omnibus Company.

COMMERCIAL VEHICLE PARADE FOR 1915.—At the June meeting of the committee of the Commercial Motor Users' Association it was decided to hold the annual parade again in London next year, and to consider the question of holding parades in the provinces.

SCOTTISH MOTOR EXHIBITION.—This annual show is to be held from November 20 to 30. The date has been brought forward from January to November in order to overcome the general depression in trade during the period intervening between the Olympia Exhibition and the Scottish Show.

MIRRORS SUGGESTED FOR HEAVY VEHICLES.—The general purposes committee of Hampshire County Council have been recommended by the Motor Car Committee to adopt a by-law to compel mirrors to be used on locomotives and heavy motor vehicles, so that drivers can see when other vehicles desire to pass them.

OMNIBUSES ON MACADAM ROADS.—Councillor Harrison Barrow, chairman of the Birmingham Tramways Committee, has recently stated that the use of motor omnibuses on the Radnor route proved that they could not run omnibuses over water-bound macadam roads without great damage resulting.

CAPTAIN T. M. HUTCHINSON, who has had charge of the last two subsidy vehicle trials for the War Office, has been appointed secretary to the Mechanical Transport Committee of the Army Council. The post has been relinquished by Captain A. E. Davidson after five years' service, consequent upon his removal to Ireland.

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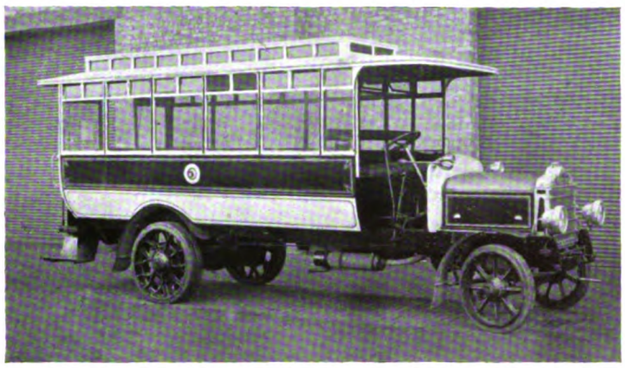
MOTOR TRAFFIC.

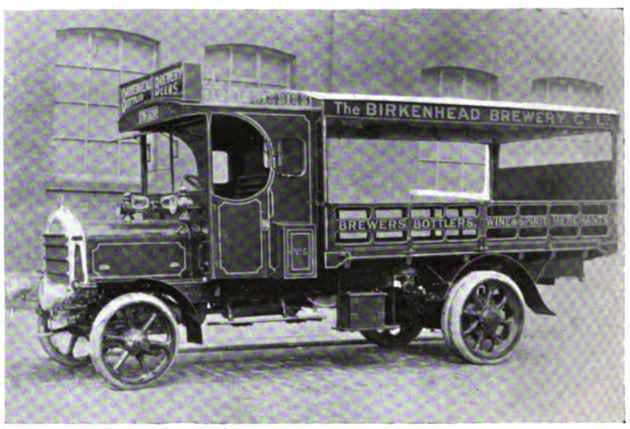
Daimler Omnibus for Constantinople.—The Daimler Company have supplied several 30 h.p single-deck omnibuses to the Compagnie



General d'Omnibus et d'Autobus of Constantinople. One of these machines is illustrated on this page. It has seating capacity for 25 passengers.

Daimlers for Trade Use.—The appended photographs show a Daimler 2 ton lorry in the service of the Brighton and Hove General Gas Company, and a 3-ton brewer's dray belonging to the Birkenhead Brewery Company, Limited.

Brighton Gas Company s 2-Ton Daimler Lorry.



3-Ton Daimler for Brewery Service.

A Fleet of Albion Vans.—The group of vehicles illustrated below are owned by Mr. F. Bentall, a draper and warehouseman of Kingston-on-Thames. They were all supplied by the Albion Company by

A Fleet of Albion Vans.

repeat orders placed over a number of years, a clear indication that the owner has found the Albion type thoroughly satisfactory.

Results of the Subsidy Trials.—As the result of the trials of commercial vehicles recently held by the War Office, the following firms have been certified as qualified to build motor lorries in accordance with the regulations of the Subsidy Scheme of 1912: Commercial Cars, Limited, Dennis Brothers (1913), Limited, and Leyland Motors (1914), Limited.

Omnibuses Instead of a Tramway.—In connection with the Falkirk and District Tramways a motor omnibus service is to be instituted between Falkirk and Grangemouth in lieu of constructing a tramway for which powers were obtained some time ago. The service will probably be inaugurated about the end of August. Proposals for other motor services are under consideration.

Lecture on Tires at Manchester.—Tne members of the Manchester Rotary Club were entertained on June 16 by Mr. Leo Swain, of Leo Swain and Company and the Polack Tire and Rubber Company, Limited, of Manchester, with a lecture on tires. It is understood that at a future lecture Mr. Swain will show by means of cinematograph views the method of manufacturing pneumatic and solid tires.

Scope for Another Omnibus at Perth.—A demand is being made at Perth for a third motor omnibus to be run in connection with the Tramways Department. The two vehicles now in use produce, it is said, a net revenue of about £80 per annum after paying all charges, including one-fifth of the purchase price. The cost of maintenance is about £170, the figures being increased owing to the work having to be done at night and on Sundays. The sum of £55 was also paid last year for the hire of a third omnibus while repairs were being executed.

Roads Improvement Association.—The Royal Automobile Club has increased their grant to the Roads Improvement Association for 1914 to £200. The Society of Motor Manufacturers and Traders and the Cycle and Motor Cycle Manufacturers and Traders' Union have also renewed their subscriptions to the Roads Improvement Association of £100 and £21 respectively. The indivdual membership to the Association is growing, and it already shows an increase on 1913.

INSTITUTION OF AUTOMOBILE ENGINEERS.

Arrangements have been made for members of this institution to visit Belgium from July 11 to July 18. At Liege on July 13 a visit will be paid to the works of the Minerva Motor Company, the directors entertaining them at luncheon. On the following day special cars will be provided for a visit to the works of the Fabrique Nationale d' Armes de Guerre (F.N). In the afternoon another tramcar journey will bring the members to the works of Messrs. G. Derihon, where they will be shown the manufacture of various parts of the automobile. Proceeding to Brussels the party will be conveyed by tramcar to the works of the Societé Anonyme John Cockerill at Seraing. In the afternoon the pressing of chassis frames, axle casing, etc., and the manufacture of cold-drawn steel tubes will be viewed at the works of Messrs. Dyle and Bacalan. On July 16 there will be a visit to the works of Messrs. Mabille and R. Pelgrim, where steel castings and motor omnibus wheels will be seen in course of manufacture. A visit to the carriage building factory of Messrs. Vanden Oles has been arranged for July 17. During their stay in Brussels the visitors will be officially received and entertained by the Chambre Syndicale.

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THE

Tramway & Railway World

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Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than 3 p.m. on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

COUNTY BOROUGH OF BLACKPOOL.

TRAMWAYS DEPARTMENT.

UNIFORM OVERCOATS.

Tenders are invited for the supply and delivery of Overcoats for Inspectors, Motormen and Conductors for the ensuing two years. Specification and form of tender may be obtained on application to the undersigned.

Tenders, in sealed envelopes, endorsed "Tenders for Overcoats," addressed to the Chairman of the Tramways and Electricity Committee, Electricity Works, West Caroline Street, Blackpool, to be received not later than Wednesday, July 22, 1914.

The Corporation do not bind themselves to accept the lowest or any tender.

CHARLES FURNESS,
Borough Electrical Engineer and
Tramways General Manager.

General Offices, West Caroline Street, Blackpool.
July 7, 1914.

CITY OF WESTMINSTER.

MOTOR WAGONS.

The Westminster City Council invite tenders for the supply and maintenance of One, Two, or Four Motor Tip Wagons, fitted with interchangeable dust and water bodies.

The Council are prepared to consider tenders for petrol wagons, steam wagons, wagons conforming with the War Office Subsidy requirements, and for any other types of wagon, subject to compliance with the Council's general requirements as to dimensions, etc., stated in the tender form.

Particulars and form of tender may be obtained on application at the City Hall, between the hours of 10 a.m. and 4 p.m. (Saturdays 10 a.m. and 12 noon).

Each tender, on the official form supplied, is to be delivered at the City Hall in a sealed cover, addressed to the Town Clerk, and marked "Tender for Motor Wagons."

Tenders may be placed by or on behalf of tenderers in a locked box at the City Hall provided for the purpose. No tender will be received after 12 noon on Thursday, July 16, 1914.

The contractor will be bound by the contract in the case of all workmen to be employed by him to pay wages at rates not less, and to observe hours of labour not greater, than the rates and hours recognised by the associations of employers and employees and in practice obtained in the district where the work is to be executed.

Tenderers are prohibited from directly or indirectly canvassing members or officials of the Council in reference to any tender, and the tender of any person who does so canvass will be rejected.

The Council do not bind themselves to accept the lowest or any tender.

JOHN HUNT,
Town Clerk.

Westminster City Hall, Charing Cross Road, W.C.
July 1, 1914.

COUNTY BOROUGH OF GRIMSBY.

TENDERS FOR PEAK LOAD BATTERY, ETC.

The Grimsby Corporation invite tenders for the supply, erection and delivery of the following, in accordance with Specification No. 116:—

1. 790-ampere Hour Battery, at the One Hour Rate.
2. Hand-regulated Reversible Booster for above.
3. Switchgear for same.

Copies of specification, general conditions, etc., can be obtained from W. A. Vignoles, M.I.E.E., Electricity Works, Grimsby, on payment of one guinea, which will be returned on receipt of a *bonâ fide* tender. The Committee do not bind themselves to accept the lowest or any tender.

Tenders must be on the form attached to the specification, and must be delivered to me at the Municipal Offices, Grimsby, not later than the first post on Thursday, July 23, 1914, in sealed envelopes, endorsed "Electricity Department."

J. W. JACKSON,
Town Clerk.

Grimsby, July 8, 1914.

CITY OF MANCHESTER.

The Electricity Committee of the Manchester Corporation invite tenders for the supply of the following:—

(A).—Sub-Station 6,600-volt Switchgear (1 year's requirements).

(B).—Fuse Boxes (2 years' requirements).

Specification, forms of tender and drawings, may be obtained on application to Mr. F. E. Hughes, Secretary, Electricity Department, Town Hall, Manchester, on payment of a fee of one guinea for each specification, which amount will be refunded on receipt of a *bonâ fide* tender.

Further particulars and information may be obtained from Mr. S. L. Pearce, Chief Electrical Engineer, Dickinson Street, Manchester.

Tenders, duly endorsed and addressed to the Chairman of the Electricity Committee, must be delivered at the Town Hall, not later than 10 a.m. on Friday, the 24th instant.

The Corporation do not bind themselves to accept the lowest or any tender.

THOMAS HUDSON,
Town Clerk.

Town Hall, Manchester. July 7, 1914.

SOUTH INDIAN RAILWAY COMPANY, LTD.

The South Indian Railway Company, Limited, are prepared to receive tenders for the supply of:—

No. 1. Rolling Stock—Steel Covered Goods Wagons, Open Goods Wagons, and Timber Trucks (broad gauge).

No. 2. Rolling Stock—45ft. and 50ft. Carriage Underframes (metre gauge).

Specifications and forms of tender may be obtained at the company's offices.

Tenders, addressed to the Chairman and Directors of the South Indian Railway Company, Limited, marked "Tender for Rolling Stock," must be left with the undersigned not later than 1 o'clock on Wednesday, July 29, 1914.

The company is not bound to accept the lowest or any tender.

A charge, which will not be returned, will be made of 40s. for each copy of specifications Nos. 1 and 2.

Copies of the drawings may be obtained on payment at the offices of Robert White, Esq., M.Inst. C.E., Consulting Engineer to the company, 3, Victoria Street, Westminster, S.W.

By order, NEVILLE PRIESTLEY,
Managing Director.

Company's Offices, 91, York Street, Westminster, S.W.
July 8, 1914.

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TURTON URBAN DISTRICT COUNCIL.

ELECTRICITY DEPARTMENT.

The Electricity Committee of the Urban District of Turton invite tenders for the supply, delivery and erection or laying of :

Overhead Lines.
Underground Cables.

Specification and form of tender may be obtained from Mr. Fredk. C. Sprigg, the Council's Electrical Engineer, Council Offices, Bromley Cross, near Bolton, on receipt of a deposit of one guinea, which will be refunded on receipt of a *bonâ fide* tender.

Tenders, sealed and endorsed "Tender for Cables," must be delivered to the undersigned at the Council Offices, Bromley Cross, near Bolton, not later than 12 noon on Thursday, July 23, 1914.

The acceptance of any tender will be subject to the sanction of the Local Government Board being granted for the necessary loan.

The Council do not bind themselves to accept the lowest or any tender.

J. B. Goulburn,
Clerk to the Council.

July 6, 1914.

COUNTY BOROUGH OF WARRINGTON.

TRAMWAYS DEPARTMENT.

The Electricity and Tramways Committee of the County Borough of Warrington invite tenders for Steel Tramway Poles.

Specification and form of tender can be obtained from the undersigned on payment of one guinea, which will be returned on receipt of a *bonâ fide* tender. Five shillings per copy will be charged for extra copies of specification.

Tenders, addressed to the Chairman of the Electricity and Tramways Committee, Town Hall, Warrington, must be sealed with wax and endorsed "Tender for Steel Tramway Poles," and delivered not later than twelve o'clock noon on Tuesday, July 21, 1914.

The lowest or any tender will not necessarily be accepted.

F. V. L. Mathias,
Borough Electrical and Tramways Engineer.

Howley, Warrington.

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VEHICLE BUILDER.

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(Continued on page 71.)

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GARRISON LANE, BIRMINGHAM.

Makers of Simplex Steel Conduit System and

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BITUMEN CABLES.
TRAMCAR HEATERS.
TRAMCAR METERS.
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WATERTIGHT FITTINGS FOR CAR SHEDS.
ENCLOSED (Indicating) FUSES (to N.E. Code or English Standard).

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Telegrams: "Jarrah. London." Telephone: 368. London Wall.

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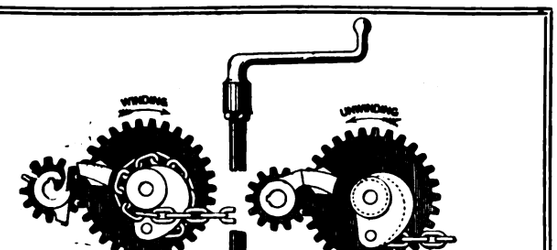

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THE
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SATURDAY, JULY 11, 1914.

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THROUGH RUNNING.

Apart from the case of London, not much has been heard lately of the desirability and advantage of extending arrangements for the through running of cars between adjacent tramway systems. The matter, however, is pointedly raised by a Bill now being considered by a Committee of the House of Commons for the amalgamation of the three adjoining towns of Plymouth, Stonehouse and Devonport into one large borough. The Bill is keenly contested, and various local interests are raised. Not the least important is that of getting through tramway connection between the three towns. Hitherto attempts to come to an arrangement between Plymouth Town Council, who work their own tramways, and the Devonport Tramways Company have failed. Yet this is a case where mutual through running powers ought to be of great advantage to both the undertakings as well as to the public. If the passage of the present Bill were to lead to such a result, it would be welcome. On the other hand, there is no necessity for amalgamating the municipal government of the three towns in order to get the through communication. It can be done by agreement at any time, just as it has been done in other cases. In this instance it would, no doubt, be desirable, in the interests of economy and efficiency, to have completely unified control, but even without that much might be done. Through running arrangements are in force in different parts of the country, and the terms arranged vary in different instances so as to suit the circumstances and secure fair play for both the contracting parties. In the case of London, the County Council have learned wisdom by experience, and not only have they through running with some of the tramways outside the county of London, but it is now part of their settled policy to extend such arrangements and to enter into agreements with other tramway authorities. Through running between adjacent tramway systems has received a fresh impetus within the last year or two, owing to the advent of motor omnibus competition. It is obviously impossible for two tramway systems to compete properly with an omnibus service if on the route there are two tramway dead ends where tramway passengers have to change cars and perhaps have to wait for several minutes, beguiling the time by watching the omnibuses sail past. Through booking is not enough; there must be through cars. A completely unified tramway service for the whole of the metropolitan area would be a great thing for the public, but if, owing to municipal policy, it cannot be got, the next best thing is absolutely unrestricted through running between all the systems which touch. And of this there is every prospect. Plymouth and Devonport, as well as some other places in the country, ought to bestir themselves. The advantages of through running visible in the past have been sufficiently strong, but they are now stronger than ever. The ratepayers of the three towns will not thank their municipal rulers if a fully organised omnibus service comes into existence to give the through facilities, while tramway passengers have to change cars at some boundary or other. The tramways will lose revenue and the ratepayers will have to pay more for road maintenance, owing to the wear produced by the omnibuses.

OXFORD OMNIBUS MONOPLY QUESTION.

The Corporation of Oxford have met with some difficulty in respect to their proposal to give to the Tramway Company the exclusive right to work and run motor omnibuses in return for a continuance of the payment of the rental of £800 per annum and the observance of other conditions. Licences for twelve omnibuses were granted to the company and for a similar number to another applicant, who has since retired from the scene. Those licences were issued on the recommendation of the Watch Committee, and after the Mayor had made a long speech setting forth the risk of legal proceedings that might arise in the event of a monopoly being set up. This warning was based upon the decision in Rex v. Barry Urban Council. In that case a monopoly was granted to persons who agreed to be bound by certain rules and to do certain things which were pleasing to the Council. The latter found out that the agreement was *ultra vires*, and cancelled it. Mr. Justice Darling, in his judgment, said: "If that agreement had remained in force, the Council could not have properly exercised their discretion in granting and refusing licences." The opinion of Mr. Moon, K.C., taken by Oxford Council in 1906, was also quoted to the effect that the Corporation could not exact consideration for such licences, nor could they grant a monopoly. As a set-off to the foregoing, a Councillor quoted the opinion of Mr. W. H. Cozens-Hardy, K.C., that though any agreement by which the Council deprived themselves of the power of exercising their judgment would be *ultra vires*, the Barry case was no authority for any suggestion that the Council could not legally license only two persons', or even one person's, omnibuses. Counsel added: "I am of opinion that if the Council, in the honest and unfettered exercise of their judgment, were to decide, for instance, to license only one omnibus out of many, or to license only a certain number of omnibuses, and to grant the licences to the omnibuses of one particular person out of

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several applicants, such a decision would be legal and effective. In support of that opinion, counsel referred to Rex v. Blackpool Corporation, 1889, a case where the reduction of omnibus licences made desirable by the congestion of traffic by a Corporation who owned the tramways and were, therefore, competitors of the licensee, was upheld. In Oxford a Bill has been promoted, the costs to be paid by the company, for obtaining sanction to the agreement arrived at between the Council and the company, and a few days since both the Bill and the agreement came before the counsel to the Speaker and to the Lord Chairman of the House of Lords. On the suggestion of these officials, and to meet the formal requirements of Parliament, the agreement has been amended by the omission of the following words: "And that during the continuance of this agreement the Tramways Company shall have the exclusive right to work and run motor omnibuses within the city," and by substituting: "So long as the Tramways Company provide as many motor omnibuses as may be reasonably necessary to meet the said requirements of the said inhabitants and visitors, the Corporation will not grant any licence for a motor omnibus to any person other than the Tramways Company." It was stated at a meeting of the Council on July 1 that a petition was being prepared to protest against the original agreement. Whether the petition will have any influence upon the Committee of the House of Commons who are to consider the Bill remains to be seen.

PRIVATE BILL LEGISLATION.

BIRKENHEAD CORPORATION.—Mr. H. J. Craig's Committee of the House of Commons on July 1 allowed the preamble of this Bill, including a clause to empower the tramways department to run motor omnibuses on six routes outside of the borough. This clause was opposed by the Wirral Railway Company, especially as regards the proposed services to Moreton, Woodchurch, and Upton. Mr. Haswell, the secretary to the company, said they gave a better and quicker through service to Liverpool than anything the proposed omnibus and tramway service could provide. He feared that the cheap omnibus and tramway fares would affect the company's through traffic. His company ran thirty-eight trains a day through Moreton to Liverpool, twenty-two of which went to Birkenhead. In the winter the Corporation would run only ten omnibuses against that number of trains, but the omnibuses would be making inroads on the company's traffic. Mr. Ram, K.C., for the company, said that Parliament had never allowed a corporation to go outside its boundaries with a speculative scheme unless it had been satisfied that there was a public case, which ought to override any case on behalf of a railway company. That the Moreton route especially would not pay was evident from the Corporation's own figures, for the minute problematical profit shown was arrived at without any allowance for road maintenance which the Corporation had agreed to pay per mile run. Mr. Thomas, replying for the Corporation, said the proposed omnibus services were meant practically to be extensions of their tramways, so that they might follow the population into the out districts, where they were going, without incurring the great expense of laying tramways. The Bill was ordered to be reported to the House.

LONDON COUNTY COUNCIL.—On July 6 the Duke of Bedford's Committee of the House of Lords disallowed the clause in the London County Council (Tramways and Improvements) Bill providing for the construction of a double line of tramway from the terminus at Aldgate, through Mansell Street, to Tower Hill, and a single loop-line around Trinity Square. The object of the project was to relieve the congestion at Aldgate, and the clause had previously been passed by a Committee of the House of Commons. The City Corporation, the Port of London Authority, and the authorities of Trinity House renewed their opposition on the ground that the proposal was not the best means of meeting the difficulty at Aldgate, that the line would depreciate property in Trinity Square, and that it would result in congestion of traffic in Mansell Street and the northern approach to the Tower Bridge. Among the witnesses were Mr. A. L. C. Fell, chief officer of the tramways, who stated that the Aldgate terminus was the most congested one in London, and Sir W. N. Bower, Commissioner of the City Police, who gave evidence against the scheme. The latter witness alleged that the proposal would diminish the advantages gained by the construction of the Tower Bridge.

LONDON UNITED TRAMWAYS COMPANY.—This Bill, which has been passed by a Committee of the House of Commons, has since been before the Committee of the House of Lords on unopposed Bills. The measure was passed. Its object is, among other things, to enter into leasing and working agreements with other companies and authorities owning contiguous tramways, and, with the permission of the Board of Trade, to use trailer and coupled carriages.

BRISTOL CORPORATION.—The Examining Committee on Parliamentary Bills on July 6 dismissed petitions which had been lodged against this Bill for the purchase of the tramways of the Bristol Tramways and Carriage Company. The petitions, which had been lodged by the Ratepayers' Association, West Gloucestershire Water Company, and Bristol Water Company, alleged that the notices given by the Council when promoting the measure did not cover its present provisions. This circumstance was due, however, to the Lords' Committee, after hearing the Company's objection to the Bill as originally framed requiring the insertion of the clauses now objected to.

MIDDLESEX COUNTY COUNCIL.—A Committee of the House of Lords, presided over by the Duke of Bedford, on July 8, began their consideration of the Middlesex County Council Bill, under which it is proposed to construct a new Great West Road, from Chiswick to a point in the parish of Heston, where it will join the Bath Road. A Committee of the House of Commons, presided over by Col. Bathurst, had sanctioned the Bill on May 8, including a clause to compel motor omnibuses using the road to contribute ⅛d. per mile run. The Bill was again opposed by the London Omnibus Owners' Federation. Mr. H. T. Wakelam, engineer to the Council, said the road was needed in order to deal with the congestion in Brentford. The total cost was estimated at £502,809. It was proposed that the foundation should be constructed of reinforced concrete, in view of the heavy traffic, and the County Council was asking that motor omnibuses should pay a special contribution towards the cost of maintenance. Cross-examined by Mr. Freeman, K.C., witness said he knew that the Road Board had expressed the view that in principle they were opposed to charging omnibuses, but he pointed out that the Road Board had nothing to do with the maintenance of the road.—Yesterday (Friday) the Committee allowed the Bill to proceed, including Clause 25, which enables the Council to require motor omnibus companies to give them access to their books and to make returns of the mileage run by their vehicles on the new road, and to charge the companies ⅛d. per mile run towards the expense of maintaining the road.

SHEFFIELD CORPORATION.—On July 7 Mr. Middlebrook's Committee of the House of Commons considered the amended clause relating to the Council's application to run motor omnibuses outside the city boundaries. The clause had been amended in accordance with the Committee's decision that the Corporation should pay ⅛d. per omnibus mile to the West Riding and Derbyshire County Councils, that figure to be subject to revision at intervals of three years. An application was made by the Midland Railway Company that a similar sum should be paid to them in respect to repairs of the approaches to a bridge on one of the omnibus routes. The Committee, however, refused the application. Some discussion took place as to the meaning of the decision that a reasonable service should be provided within three years of the passing of the Act, and it was agreed that the Board of Trade should decide whether the service provided was reasonable within the meaning of the section.

L.C.C. TRAMWAY MATTERS.

TRAMWAYS IN HIGH STREET AND EAST HILL, WANDSWORTH.

At last Tuesday's meeting of the London County Council the Highways Committee recommended the construction on the underground conduit system of the tramways in High Street and East Hill, Wandsworth, which were authorised by an Act of 1913. These lines will form a connecting link between the tramways in High Street and East Hill, and will be specially valuable in improving the receipts from the existing lines. The total estimated cost of construction and equipment is £29,350, the items being as follows:—Trackwork, including special work, paving and alterations of mains, £26,000; cables, £305; ducts, £75; feeder pillars, £30; cars, £2,850. The Finance Committee, in commenting on the report, recommended as chargeable to capital (25 years) account the cost of the trackwork excluding the alterations to mains. They remark that the cost works out at about £19,400 a mile of single line. This high figure is due mainly to the large amount of junction and cross-over work for a comparatively short length of line. It has been agreed that one-third of the net cost of certain widenings shall be charged to the tramways account.

TRAILER CARS.

The Board of Trade having consented to the use of trailer cars on a number of routes, and having approved the design to be adopted for the cars, the Council is now is a position to purchase the cars and equipments. The Highways Committee accordingly obtained the following tenders:—

	50 trailer cars.*	100 trailer cars.*	150 trailer cars.*
Brush Electrical Engineering Co., Ltd.	£29,500	£51,900	£74,200
Hurst, Nelson and Co., Ltd.	31,300	56,200	80,750
United Electric Car Co., Ltd.	33,350	58,600	83,750
Norddeutsche Wagon-fabrik Actien-Ges. ...	35,500	65,000	93,500

* All tenders include the equipment of 200 cars as tractor cars.

The Committee recommended that the tender of the Brush Electrical Engineering Company for 150 trailer cars and the equipment of 200 electric cars as tractors should be accepted and

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that they should be allowed to sublet certain portions of the work. The Finance Committee had considered the report and approved that the cost should be chargeable to capital (25 years) account. The expenditure of £80,250 will involve debt charges of £6,220 in the first year, decreasing by about £120 a year as the debt is paid off. The Highways Committee estimate that a trailer car can be operated at a total cost of approximately £338 per car per year less than the cost of operating an ordinary electric car. The present car shed accommodation, which can at comparatively small cost be made available, is sufficient for the additional number of cars now proposed.

Consideration of the report was postponed.

METALLIC FILAMENT TRACTION LAMPS.

The Highways Committee recommended that tenders should be invited from selected firms for the supply of metallic filament traction lamps of 22 candle-power, 115 volt rating.

THE MUNICIPAL TRAMWAYS ASSOCIATION.

ANNUAL CONFERENCE, 1914.

The annual conference of the Municipal Tramways Association (Incorporated) will be held at Salford on September 22, 23 and 25. The following papers will be read and discussed at the meetings:—

"Some Notes on Transit Facilities for Passenger Transportation in Large Cities," by Mr. J. M. McElroy, Manchester.

"Trailer and Coupled Cars," by Mr. A. L. C. Fell, London.

"The Utilisation of Tramways for Goods Traffic," by Mr. W. Clough, Bury, and Mr. G. W. Holford, Salford.

The headquarters of the Association will be at the Midland Hotel, Manchester. An attractive programme is being prepared and will be issued in due course.

MISCELLANEOUS NEWS AND NOTES.

Depôt Extension and New Cars for Blackpool.—The sum of £6,000 is to be borrowed for an extension of Blundell Street car depôt, and for the purchase of six open-type cars and electrical equipment.

No Passes for Sheffield Tramway Committeemen.—The Tramways Committee of Sheffield Corporation have decided to discontinue the custom of granting free passes to members of the committee.

Track Relaying at Colne.—The Town Council have decided that a portion of the tramway in Burnley Road shall be relaid at a cost of £2,000, and that sanction for a loan for the purpose be obtained.

Free Passes for the Blind.—At the request of the Colne Blind Aid Prevention Society, the Corporation have instructed the manager to issue a free pass to blind persons upon the recommendation of that society.

Collecting Fares on the Platform.—Nottingham tramway conductors are rejoicing at the issue of an order permitting them to collect fares on the platforms of the cars. Hitherto they have not been permitted to take that course.

Reward for a Motorman.—On the recommendation of the general manager (Mr. Nance), the Belfast Tramways Committee have awarded Motorman Faloon a bonus of £5 for exceptional skill in preventing what might have been a serious tramway accident on the Cliftonville Road.

Bristol Tramway Poll.—The Lord Mayor of Bristol as returning officer recently reported the result of the tramway poll taken on June 13, when 18,057 parochial electors voted for the purchase of the tramways, and 14,694 against, being a majority of 3,163 for the purchase. The expenses amounted to £859 5s.

The International Time Recording Company, Limited, owing to greatly increased business have given up their premises in City Road, E.C., and have taken the entire five-storey building, 30-32, Farringdon Road, E.C., where they will be pleased to show their automatic recorders for time-keeping and job costing.

Important Scheme at Oldham.—An outlay of £40,000 is to be made for the provision of new machinery and extension at Oldham electricity works, in accordance with a recommendation made in a report prepared by Mr. R. Blackmore, chief engineer to Stalybridge and District Tramways and Electricity Board.

Numbering of Manchester and Salford Routes.—Manchester and Salford Corporations are numbering the tramcars to show what routes they travel on. To avoid confusion with the Manchester cars on the Deansgate route, on which the Salford cars also run, the latter will have a large capital S prefixed to the number of the route.

Omnibuses for Nottingham.—The Tramways Committee have placed an order for two motor omnibuses, which will be placed in service between Gregory Street, Lenton, and Dunkirk. Gregory Street will be the terminus of the Derby Road tramways, which are now in course of construction. When this route is completed the new lines from Sherwood to Daybrook and Arnold will be laid.

Transfer Tickets in Lieu of a Through Service.—On July 6 Salford Tramways Committee ceased running the special service of cars from Weaste to Trafford Bridge for the benefit of workers employed in Trafford Park. These passengers now receive a transfer ticket and have to change cars at the junction of the Eccles New Road and Trafford. This is the first issue of a transfer ticket in Salford, and it will enable passengers to proceed by any car instead of having to wait for a particular car.

Tramway Shelter at Manchester Southern Cemetery.—A Local Government Board inquiry was held on July 6 at Manchester into an application by the Corporation to use a small portion of the Southern Cemetery for the erection of a shelter for tramway passengers and the provision of conveniences. The structure is to cost £750, and the outlay will be defrayed by the Tramways and Sanitary Committees.

Trial Run of a South Western Electric Train.—The first of the electric trains for service on the suburban lines of the London and South Western Railway was given a trial trip on Saturday last between Wimbledon and East Putney. Each coach will accommodate 200 passengers, and is divided into compartments with side doors. The Kingston roundabout line from Waterloo *via* Wimbledon and Richmond will be the first portion of the system to be electrically worked.

Extensions at Leith.—A deputation of the Leith Tramways Committee recently met the Edinburgh Tramways Committee with reference to extensions of the system in Leith. The representatives of the Leith Committee wish that a tramway should be constructed along the Seafield Road to King's Road, Portobello. On the part of Edinburgh a counter scheme was suggested by which self-propelled cars would be used. The mileage of the route is six and a half miles, some two and a half miles being in Leith.

Parcels and Dogs at Salford.—The Tramways Committee have decided to make a charge for the conveyance of parcels over 28lbs. in weight. Replying to a complaint of dogs having been allowed to occupy a seat, although they are carried free of charge, Alderman Linsley, chairman of the Committee, has stated that a good deal was in the discretion of the tramcar conductor, who could decline to allow objectionable passengers to travel by car, and could deal with such matters as the conveyance of dogs.

Manchester's Offer for Road Maintenance.—At the last monthly meeting of the committee of the Commercial Motor Users' Association consideration was given to the motor omnibus proposals of Manchester Corporation Bill, 1914. The question of making a grant to support opposition to the proposal of the Manchester Tramways Committee to pay 2d. per mile run to certain authorities in respect of projected motor omnibus services was considered, and correspondence was reported with the Manchester, Liverpool and Counties Commercial Motor Users' Association. It was resolved that a donation of £20 should be made to support the opposition.

The Special Congress Number of the "Tramways and Light Railways Association Journal" (July) contains the programme of the annual congress to be held on Thursday and Friday, July 16 and 17, and the papers which will be read. These fill fifty pages, and are as follow:—"Some Features of the Newcastle Tramways," by Councillor Richard Mayne, vice-chairman, Newcastle-upon-Tyne Corporation Tramways Committee; "Tramway Experiences in Brazil," by H. M. Sayers; "Standard Tramway Rails: Comparisons between English and Foreign Sections," by Fred Bland; "Town Planning in Relation to Tramways," by J. H. Brodie, city engineer of Liverpool.

Leeds Tramwaymen's Wages.—The new General Purposes Committee of Leeds Corporation on July 6 heard an application made by Mr. G. H. Pearson, local secretary of the Tramway and Vehicle Workers' Union, for a variation to be made in the agreement entered into in August, 1911, in regard to the tramway employees' wages. An all-round increase of a halfpenny per hour in the wages of motormen and conductors is asked for, and graduated advances in pay for repairers and car cleaners (night staff), and spare conductors and motormen. The Union also asked that the working hours of motormen and conductors should average fifty-four per week. The reasons for the applications were given as "increased work done, more exacting duties, and the increased cost of living."

Management of Wigan Tramways.—At present the Wigan Corporation Tramways are under the control of a general manager and electrical engineer (Mr. J. Slevin) and a traffic manager (Mr. F. Buckley). At the July meeting of the Council the following resolution, proposed by Councillor R. Fletcher, chairman of the Tramways Committee, was agreed to:—"That the Tramways Committee be instructed forthwith to take such steps as are necessary to appoint a general manager to be in sole charge of all sections of the tramway undertaking except the permanent way."—In reply to a question by an alderman if it would be in order to move that it be an instruction to the Tramways Committee to advertise for a tramways engineer and manager, the Mayor said that had better be left to the Committee.

Efficiency of London Tramcar Lifeguards.—At an inquest on a four-year-old child held at Southwark, it was shown that the boy fell sideways, missing the guard and getting beneath the wheels. A representative of the County Council said no child under the age of four had ever been known to get beneath the "catcher" of the lifeguard, which was normally 2½ inches from the track. No adult could get beneath it. A number of instances had occurred in which lives had been saved by the guards, but there had been one or two cases in which children had fallen behind the gates of cars, and the trays had missed them, as in this case. So delicately were the guards adjusted that a strong wind sometimes caused the gate to descend and lower the tray. The jury's verdict was "accidental death."

Importance of Through Tramway Services.—Before a House of Commons Committee recently Mr. J. H. Ellis, town clerk of Plymouth, in giving evidence in favour of the amalgamation of Plymouth, Stonehouse and Devonport, declared that a through service of cars was essential for the convenience of the three towns, and he had been working to secure that almost

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ever since he had been in Plymouth. The difficulty had been due chiefly to the existence of local jealousies and the different policies pursued by each of the three towns. The tramways were now all of one gauge, and the physical difficulties had been removed. Nevertheless the municipal impediment still remained, but if the three towns were amalgamated through running would follow as a matter of course. In reply to Mr. Mackesy, the counsel for Plymouth, Mr. Ellis, said he saw no remedy if municipal jealousies were allowed to continue. He added that Plymouth Corporation had power to make agreements for through running with other tramway systems subject to the approval of Devonport Corporation. Devonport District Tramways Company were extremely anxious to make arrangements so that the public might have the benefits of through running.

Hull Tramwaymen's Sports.—Hull tramwaymen at present hold the Yorkshire tug-of-war championship, gained for the fourth successive time a few weeks ago. A tug-of-war was the special event of the second sports meeting, which was held on June 27. Six teams competed for the magnificent 100-guinea challenge cup, offered and won last year by the Hull men, viz., Grimsby Dock Police, Hull Police, Sheffield Tramwaymen, Leeds Police, and A and B Tramway teams. At the finish the Hull A men met their old friendly foes, the Sheffield Tramwaymen (a very fine combination), whom they conquered three weeks ago at the Hull Police Sports. On this occasion also the Hull men maintained possession of the cup and accompanying prizes for another year, the Sheffield men obtaining second prizes. The Lord Mayor (Councillor J. H. Hargreaves, J.P.) and the Lady Mayoress were present, and as this was the first public function they had attended after the honour of a Lord Mayoralty had been conferred upon the city directly by the King, who had visited Hull on the preceding day, they met with a vociferous reception, which was more than a little due to the fact that the Lord Mayor is the chairman of the Tramways Committee and takes a special interest in the men. The Lady Mayoress presented the prizes at the close, and Mr. W. J. McCombe, tramways manager, who presided, made a special reference to the honour which had been conferred upon the tramwaymen by the presence of the Chief Magistrate and the Lady Mayoress.

Long Service Tramway Employees.—In the quadrangle of the City Chambers, Glasgow, on July 1, an interesting ceremony took place, when 104 men who had been in the employ of the tramways department since the opening of the undertaking by the Corporation in 1894 were presented with silver badges in recognition of their service. The men, who included inspectors, motormen, and conductors, marched to the City Chambers, headed by the tramways department pipe band. Among those present were Sir James Bell, who was Lord Provost when the Corporation assumed control of the tramways, Councillors Kirkland and Alston, convener and sub-convener of the Tramways Committee, and Mr. James Dalrymple, general manager. Councillor Kirkland said that in July, 1894, there were 538 motormen and conductors, and to-day the number was 3,200. In addition to the men on parade 15 uniformed men would complete 20 years' service before the end of the month. There were 376 men with 15 years' badges, 531 with 10 years' badges, and 563 with 5 years' badges. At the head office they had eight male and seven female employees with records of 20 years' service; on the weekly staff there were five, and amongst the depôt officials 27 employees with similar records of service. Sir James Bell said they were told when the Corporation took over the tramways that the project was foredoomed to failure, but to-day the undertaking was bringing in a large revenue, and the service was unequalled throughout the world. The Tramways Committee were congratulated on their foresight and enterprise, and also on the number of old servants they had in their employment. Councillors Kirkland and Alston distributed the badges.

CONTRACTS AND ORDERS.

The United Electric Car Company, Limited, of Preston, have an order from Colne for a car and truck.

Colne Council have accepted an offer to convert one of the car trucks to the Peckham pendulum type.

Dartford Council have given a contract to Fraser and Chalmers, Limited, for a 1,000 k.w. turbo-alternator, at £4,554.

Siemens Brothers' Dynamo Works, Limited, have received an annual contract from York Council for the supply of carbon, tantalum, and tantalum traction lamps.

Accrington Council have placed a contract with the Chloride Electrical Storage Company for the cleaning and maintenance of the battery at the works for 8½ years, at an annual charge of £166.

Hull Council have placed contracts as follow for material required by the tramways department:—Creosoted wood poles, R. Wade and Sons, Hull; high voltage insulators, W. F. Dennis and Co.; high-tension hand-drawn copper wire, Edmund Le Bas and Co. The construction of the Hull Road tramways is to be proceeded with as soon as the sanction of the Board of Trade is received.

Stretford Council have placed the appended contracts on the recommendation of the Tramways and Electricity Committee:—Lancashire Dynamo &c., Company, booster; Bertram Thomas, switchboard; Tudor Accumulator Company, battery.

Sheffield Council have been recommended to accept the subjoined tenders:—Steel, Peech and Tozer, Limited, 1,000 tons of tramway rails; Willans and Robinson, Limited, manufacture and storage of spare blading material; Dick, Kerr and Co., Ltd., spare coils for alternator; Stirling Boiler Company, Limited, tubes for two Stirling boilers.

Burnley Council have allotted contracts to the British Insulated and Helsby Cables, Limited, for 2,160 yards of .1-in. cable, 1,080 yards of .05-in. cable, and 3,410 yards of .25-in. traction cable, at £1,008.

Warrington Council have allotted contracts as subjoined:—Thermit, Limited, about 100 Thermit welded joints; Titan Trackwork Company, Limited, special trackwork; A. Thorne and Sons, two sockets for tramway poles.

Manchester Council have approved of the following contracts:—Welding of rail joints, Tudor Accumulator Company; ironwork for tramway refuges, W. Macfarlane and Co.; 5,000/6,000-kw. turbo alternator for Stuart Street power station, British Westinghouse Company, with permission to sublet as follows—alternator, Siemens Brothers' Dynamo Works; portion of pipework and condensing plant, Mirrlees, Watson and Co., Ltd.

Doncaster Council have sanctioned the following contracts for tramway extensions:—Contract No. 1, Warmsworth: J. W. Pearce and Co., Ltd., permanent-way construction, £7,000; contract No. 2, Brodsworth: Edwards and Co., permanent-way construction, £10,433; contract No. 3, British Insulated and Helsby Cables, Limited, copper bonds, £341; contract No. 4, Guest, Keen and Nettlefolds, Limited, tie-bars, bolts, nuts, etc., £306; contract No. 5, Hadfield's, Limited, points and crossings £1,457.

British Thomson-Houston Company, Limited, have received the following orders in connection with London railway electrification:—London and North Western Railway: main station switchgear for controlling the turbo-alternator plant in the Wembley power station; six 1,000 kw. and 25 750 kw. rotary converters for use in substations. London and South Western Railway: Eight 1,000 kw. and 15 1,500 kw. rotary converters; main station switchgear for controlling the turbo-alternator plant in the Wimbledon power station.

PERSONAL.

Sir John Snell is to be entertained at a complimentary dinner in the early autumn in recognition of the honour of knighthood recently conferred upon him. Mr. P. F. Rowell, at the Institution of Electrical Engineers, and other gentlemen, are receiving names of those wishing to associate themselves with the movement.

Mr. J. Slevin has been appointed borough electrical engineer of Wigan, as from August 1 next, at a salary of £400 per annum, with house, coal, and light, in order that he may devote the whole of his time to the electricity undertaking. The Council have directed the Tramways Committee to take the necessary steps for the appointment of a general manager of the tramways department.

Councillor Hargreaves, chairman of the Hull Tramways Committee, on July 2 took his place for the first time as Lord Mayor at a meeting of the City Corporation. The higher status was conferred on the city by the King on the occasion of the opening of the new dock. Several members of the Corporation congratulated Councillor Hargreaves upon the distinction having been conferred on the city during his term of office, and the Lord Mayor suitably responded.

Mr. H. C. Levis has been elected a member of the Council of the Institution of Electrical Engineers. In mentioning this appointment last week it was inadvertently made to refer to the B.E.A.M.A. The error would, no doubt, be detected by most of our readers, who are aware that Mr. Levis has been for some years an active and influential member of Council of that useful and progressive institution, the British Electrical and Allied Manufacturers' Association.

Mr. J. G. R. Groves, manager of Worcester Tramways Company, was married on July 3, at St. George's Church, Barbourne, to Miss E. J. Walter, daughter of the late Mr. Walter, Supervisor of Inland Revenue, Worcester. The best man was Mr. C. W. Francis, secretary to the Tramway Company. Many valuable presents were received by the happy couple, including a silver cigarette box and silver trinket box from Mr. H. S. Day (chairman of the company) and Mrs. Day, a silver inkstand from Master Day, and an oak dining room clock with chimes from the tramway staff and employees.

FINANCIAL REPORTS AND MEETINGS.

Clontarf and Hill of Howth Tramroad Company.—An interim dividend of 3s. per share has been announced

Sao Paulo Tramway, Light and Power Company.—The directors announce a dividend of 2½ per cent. on the capital stock.

Dublin United Tramways.—The directors have declared an interim dividend for the half-year to June 30 at the rate of 6 per cent. per annum, less income tax, on the preference shares, and at the rate of 5 per cent. per annum, less income tax, on the ordinary shares.

General Electric Company.—Mr. Hugo Hirst, presiding at the annual meeting of the General Electric Company on July 2, said that the net trading profit for the year was £157,893, against £145,260 in the previous year. He mentioned that by a large minded arrangement between the leading firms of Germany, America and this country co-operation in research and laboratory experience was taking place, and it was extraordinary what rapid advances had been made. In conjunction with Messrs. Pirelli, of Milan, the General Electric Company had formed a company for the erection of a cable factory at Southampton. The capital was £200,000, each party subscribing 50 per cent. The directors hoped within a few months to supply cable which would compare favourably with that of any other firm.

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Imperial Tramways Company.—Sir George White presided at the annual meeting and moved the adoption of the report, which recommended the payment of a dividend of 4 per cent. on the ordinary capital. Adverting to the motor omnibus services at Middlesbrough, he said the company would also be running a number of high-class touring torpedo chars-a-bancs. They intended developing still further the motor business in Middlesbrough, Stockton and Thornaby by providing a service of thoroughly well-equipped motor cabs and cars. The present were only an instalment of the motor services in contemplation. With regard to the investment in the London and Suburban Traction Company, the directors of that company explained in their report that their omnibus fleet was not in full service until August last, and they anticipated considerably increased revenue in future years. The traffic returns showed that for 25 weeks this year their omnibuses had earned an increase of £164,000, so there would appear to be every reason why the anticipations of the directors of the London and Suburban Company should be fulfilled.

British Electric Traction: Scheme for Reduction of Capital.—The directors of the British Electric Traction Company recommend that the share capital be reduced by £908,372, from £2,947,380 to £2,039,008. It is proposed to consolidate the five classes of stock into £672,654 6 per cent. cumulative preference stock and £1,366,354 ordinary stock. Holders of 6 per cent. preference stock are to receive a similar amount of new 6 per cent. preference stock. The 7 per cent. preference holders will get one-third of the amount of their present holding of new 6 per cent. preference and two-thirds of new ordinary stock. Holders of preferred ordinary stock will receive one-half of the amount of their present holdings in new ordinary stock, and holders of the deferred stock will get three-tenths of the total they now hold in new ordinary stock. Thus the share capital will be reduced by £908,372. The income certificates (£266,371) are to be converted into £93,230 ordinary stock. The directors estimate that on the basis of the expected profits for the year 1914-15 the holders of the ordinary stock would under this scheme receive a dividend of 4 per cent. for the year. Every additional 1 per cent. would require a further £13,663, which is approximately the average annual increase in profits for the past four years.

(Continued from page 66.)

POSITIONS VACANT.

TO WORKS MANAGERS AND ENGINEERS.

The Directors of the Midland Railway Carriage and Wagon Company, Limited, require the services of a competent and experienced Works Manager at their new works, Washwood Heath, Birmingham.

The person appointed must have had practical experience in all departments of railway carriage and wagon construction and in the management and control of men.

Applications, which will be treated as strictly confidential, giving particulars of experience, age, and salary required, to be forwarded by post direct to the Chairman, marked "Private," on or before Tuesday, July 14.

Testimonials not required in the first instance.

H. J. ROOKE, Secretary.

Washwood Heath, Birmingham.
July 1, 1914.

TRAMCAR FOREMAN.

Wanted—Mechanic as Tram-car Foreman (12 cars). Must be qualified in the upkeep of cars and overhead. Apply in writing, giving credentials and wages required, to General Manager, 6, Lord Street, Wrexham.

BUSINESS FOR SALE.

GOOD OPENING FOR ENERGETIC MAN.—The business of the late Mr. George Conaty, 109, Colmore Row, Birmingham, is for Sale. It has been established six years, and has at present a fair amount of work in hand of a mechanical nature. Apply, Mrs. Conaty, Mayfield House, King's Heath, Birmingham.

DICK, KERR & CO.,
Limited,
ABCHURCH YARD, CANNON STREET,
LONDON, E.C.
ENGINEERS & CONTRACTORS.

Complete Equipment
TRAMWAYS & LIGHT RAILWAYS
at home and abroad.

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 60 of the principal undertakings of the United Kingdom for the week ended July 4, give total receipts of £200,142, or £11,094 more than in the corresponding week last year. The total length of track was 2,803 miles, or 24 more than for the corresponding week. Receipts were at the rate of £90 17s. 3d. per track mile, an increase of £3 2s. 10d. as compared with the corresponding week of last year.

THE BRITISH ELECTRICAL FEDERATION.

The traffic statement for the week ended July 3, 1914, shows that the receipts from tramways and railways amounted to £45,601 as compared with £44,522 in the corresponding week last year, and from omnibuses £18,028, as compared with £9,590, making a total of £63,629, as compared with £54,112. The tramway and railway route mileage was 429.82 as compared with 428.47. Upon such of the services as were working both last year and this year the receipts show an increase of £3,268 upon the week.

RAILWAYS OF THE UNITED KINGDOM.

The summary of the official traffic returns of the fifty principal railways of the United Kingdom for the week ended July 5, gives a total of £2,526,394, which was earned on 22,162 miles, being at the rate of £113 19s. 11d. per mile of line open. For the corresponding week of 1913 the receipts of the same lines amounted to £2,565,783, with 22,137 miles open, or £115 18s. 1d. per mile. There was thus a decrease of £39,389 in receipts, an increase of 25 in mileage, and a decrease of £1 18s. 2d. in receipts per mile. Thirty-six of the returns distinguish between the receipts from passenger and goods traffic, and these show a decrease of £2,366 (or 3s. 7d. per mile) in the passenger receipts and a decrease of £32,517 (or £1 11s. 2d. per mile) in the receipts from goods traffic. The aggregate receipts of the fifty railways since the beginning of the year amounted to £60,120,288, in comparison with £60,530,790 last year, a decrease of £410,502.

COPPER AND ALUMINIUM MARKET.

July 10, 1914.

Messrs. Henry R. Merton and Co., Ltd., 2, Metal Exchange Buildings, Leadenhall Avenue, E.C., supply the following quotations of prices per ton:—

	Friday, July 10.	Last week.	A Year Ago.
	£ s. d.	£ s. d.	£ s. d.
Standard Copper (cash)	61 10 0	61 13 9	62 15 0
,, ,, (three months)	61 17 6	62 0 0	63 0 0
Electrolytic Copper—bars or ingots	63 10 0	63 10 0	67 0 0
Aluminium—bars or ingots	83 0 0	83 0 0	89 0 0

COAL MARKET.

July 10, 1914.

Messrs. Locket and Judkins, of 3, Fenchurch Avenue, E.C., report as follows:—

	Friday, July 10.	Last week.	A Year Ago.	Two Years Ago.
London, free into barge in Thames—	s. d.	s. d.	s. d.	s. d.
Best Admiralty Welsh (Large)	26 6	26 0	25 6	
Best Seconds	24 0	24 0	24 0	
Ordinary Drys	21 0	21 0	21 0	
Best Washed Nuts	20 6	20 6	21 0	
Best Washed Peas	19 6	19 6	19 6	No Quotations owing to transport workers' strike.
Cardiff, f.o.b.—				
Best Admiralty (large)	22 0	21 6	21 0	17 0
Best Seconds	19 6	19 6	19 6	17 0
Ordinary Drys	16 6	16 6	16 6	15 3
Best Washed Nuts	16 0	16 0	16 6	14 0
Best Washed Peas	15 0	15 0	15 0	12 6
Newcastle, f.o.b.—				
Best Steams	15 3	14 9	15 6	13 6
Best Seconds	12 6	12 6	13 6	11 6
Smalls	9 0	8 6	10 0	9 9

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Anglo-Argentine	July 1	£53,632	£51,759	26	£1,457,739	+ £5,958
Auckland (28 days)	June 5	20,007	20,919	49	247,511	+ 6,381
Ballarat and Bendigo	April 26	4 417	4,567	4	4,567	+ 150
Brazilian St. Rly. Mlrs	May	44,820	50,237	43	523,872	+ 76,626
Brazilian Traction	July 4	93,574	95,400	1	95,400	+ 1,826
Brisbane	June	25,013	28,590	26	168,975	+ 17,972
British Columbia $	May	701,991	678,311	47	8,128,904	+ 317,358
Buenos Aires Pt. & City	May	6,925	6,713	22	56,517	+ 3,206
Buenos Aires Lacroze	June	44,078	44,139	52	534,565	+ 5 988
Calcutta Rs.	July 4	65,410	68,450	26	18,03,820	+ 100 012
Cape Town	April	12,175	13,408	17	55,388	+ 3,926
Carthagena & Herreria	June	2,158	1,405	26	13,796	— 3,5 5
Cordoba	May	13,622	14,680	8	28,084	+ 1,448
East India	June	1,892	1,906	48	21,030	+ 809
Kalgoorlie	May	3,059	3,025	22	12,830	— 1,542
La Plata	June	4,846	4,561	26	29,244	— 2,328
Lima	May	32,256	33,150	22	173,754	+ 6,825
Lisbon Mlrs.	March	...	160,592	...	...	...
Madras (14 days) Rs.	June 30	26,556	27,685	25	345,669	+ 26,504
Manaos	June	12,530	9,868	8	20,167	— 5,340
Melbourne	May	62,000	64,500	22	317 000	+ 3,000
Mexico $	May	595,795	592,275	22	2,939,082	+ 261,322
Montevideo	June	28,820	28,049	35	257,246	— 1,167
Para	June	25,273	20,914	30	150,423	— 30,495
Port Elizabeth	April	4,357	3,758	17	16,633	+ 245
Puebla $	May	61 400	65 300	22	328,800	+ 35,100
Rangoon	June	4 807	4,997	26	32,334	+ 982
Shanghai $	July 1	22,764	26,800	26	640,200	+ 99,558
Singapore $	July 4	11,569	11,153	26	321,558	+ 7,553
Toronto $	May	811,872	871,733	21	4,163,988	+ 323,708
Winnipeg $	May	326,827	387,664	21	1,756,539	+ 105,203

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TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	1914.	Incr. or Dec.	Aggregate. Wks	1913-4.	Increase or Dec.
Aberdeen Corporation	July 1	£1,711	£1,948	+ £237	4	£8,099	+ £633
Accrington Corp.	,, 1	595	617	+ 22	13	8,061	+ 497
Ayr Corporation	,, 4	462	427	— 35	7	2,892	+ 232
Bath Electric	,, 1	1,195	1,354	+ 159	26	24,078	+ 1,906
Birkenhead Corp.	,, 5	1,492	1,351	— 141	13½	17,816	+ 28
Birmingham Corp.	,, 4	11,913	13,288	+ 1,375	14	174,648	+ 15,164
Blackburn Corporation	,, 1	1,319	1,367	+ 48	14	19,490	+ 1,514
Blackpool Corporation	,, 2	2,784	3,089	+ 305	14	22,722	+ 3,940
Bolton Corporation	,, 5	2,667	2,668	+ 141	14	39,818	+ 2,100
Bournemouth Corp.	,, 8	2,016	2,157	+ 141	14	30,367	+ 2,043
Bradford Corporation	,, 4	6,282	6,623	+ 341	14	88,265	+ 5,389
Brighton Corporation	,, 5	1,140	1,385	+ 245	13½	15,684	+ 1,406
Bristol	,, 3	13,261	10,490	— 2,771	26½	219,969	+ 17,487
British Elec. Federatn	,, 3	54,112	63,623	*	...	...	...
Burnley Corporation	,, 4	1,659	1,764	+ 105	14	24,020	+ 890
Burton-on-Trent Corp	,, 5	289	332	+ 43	14	4,202	+ 248
Bury Corporation	,, 5	1,423	1,454	+ 31	13½	19,633	+ 613
Cardiff Corporation	June 27	2,887	2,953	+ 66	12	36,648	+ 2,428
Chatham and District	July 2	1,064	1,081	+ 17	26	23,510	+ 376
Chesterfield Corp.	June 25	251	252	+ 1	12	3,519	+ 399
Colne Corporation	July 4	345	317	— 28	..	...	...
Cork Electric	,, 2	613	608	— 5	26	12 843	+ 243
Croydon Corporation	June 26	1,742	1,891	+ 149	12	22,789	+ 1,671
Darlington Corporation	July 4	251	282	+ 31	14	3 684	+ 222
Derby Corporation	,, 4	1,010	1,117	+ 107	13½	14,437	+ 808
Dover Corporation	,, 4	255	294	+ 29	14	3,344	+ 116
Dublin & Lucan	June 30	267	312	+ 45	26	3,583	+ 24
Dublin United	July 3	7,710	7,724	+ 12	26	151,541	— 3,456
Dundee City	,, 8	1,280	1,402	+ 122	7½	10,501	+ 311
East Ham Corporation	,, 4	1,029	1,157	+ 128	13½	14.776	+ 745
Exeter Corporation	,, 3	407	408	+ 1	14	5,016	+ 375
Gearless Motor 'Buses	,, 4	603	497	— 106	27	13.636	+ 7,810
Glasgow Corporation	,, 4	20,845	21,615	+ 770	5	107.852	+ 7,194
Glossop(U.Elec.Supply	,, 4	138	136	+ 3	27	3.343	— 83
Halifax Corporation	June 30	2,320	2,442	+ 122	13	29,905	+ 1,816
Hastings & District	July 1	1,140	1,228	+ 88	26	23,263	+ 391
Huddersfield Corp.	,, 4	2,187	2,585	+ 398	14	33,271	+ 3,562
Hull Corporation	,, 4	3,088	3,410	+ 322	14	44,281	+ 1,900
Ilford U.D.C.	,, 4	493	654	+ 161	13	7,391	+ 1,050
Ilkeston Corporation	,, 8	136	133	— 3	14	1,928	+ 21
Ipswich Corporation	,, 4	519	554	+ 35	14	6,675	+ 583
Isle of Thanet	,, 4	1,129	1,148	+ 19	40	18,202	+ 859
Kilmarnock Corp.	,, 4	174	176	+ 2	7	1,269	— 50
Lanarkshire	,, 2	1.844	2,015	+ 171	26	49,753	+ 6,473
Lancashire United	,, 1	1,681	1,793	+ 112	26	42 915	+ 4,807
Leeds City	,, 4	8,683	9,127	+ 444	14	118,692	+ 5,058
Leicester Corporation	,, 4	2,942	3,229	+ 287	27	77,574	+ 4,060
Leith Corporation	,, 4	820	813	— 7	7	5.574	+ 177
Leyton U.D.C.	,, 2	1,492	1,573	+ 81	13	18,906	+ 911
Liverpool Corporation	,, 4	13.751	14,537	+ 786	26½	347,971	+ 16,465
Llandudno & Colwyn B	,, 3	492	497	— 2	31	7.414	+ 54
London County Counci	,, 1	43,445	45,628	+ 2,183	13	584,359	+ 27.071
London Gnl. Omnibus	,, 4	71,548	78,066	+ 6,518	27	1,698,094	+ 40,780
London United	,, 3	7.712	7,568	— 144	27	168 746	+ 2,397
Lowestoft Corporation	,, 4	219	247	+ 28	39	7,414	+ 809
Maidstone Corporation	,, 2	217	227	+ 10	14	2 953	+ 198
Manchester Corp.	,, 4	18.239	19,350	+ 1,111	14	248,666	+ 7.890
Met. Elec. Trys.	,, 3	10,118	10,621	+ 503	27	243,112	+ 5,491
Nat. Steam Car Co., Ld.	,, 7	3,253	4,629	+ 1,376	35	150,107	+ 61,870
Nelson Corporation	June 27	282	304	— 26	12½	2,785	+ 94
N'castle-on-Tyne Corp	July 4	4,616	5,231	+ 615	14	74,622	+ 7,227
Newport (Mon.) Corp.	,, 4	796	836	+ 90	14	11,606	+ 1,330
New St. Helens & Dist.	,, 1	887	936	+ 49	1 day	115	+ 7
Northampton Corp	,, 3	630	646	+ 16	13½	8,178	+ 299
Nottingham Corp.	,, 2	3,389	3,668	+ 279	13½	47.445	+ 2,377
Oldham Corporation	,, 5	2,234	2,419	+ 185	15	34,581	+ 2,515
Portsmouth Corp.	,, 4	2,790	2,850	+ 60	14	33 767	...
Preston Corporation	,, 1	870	907	+ 37	14	12,632	+ 404
Provincial	,, 4	2,418	2,381	— 37	39	72,881	+ 4,230
Reading Corporation	,, 2	731	774	+ 43	13	9,720	+ 748
Rhondda	,, 2	1,226	1,270	+ 44	26	32,317	+ 1,752
Rochdale Corporation	,, 4	1,674	1,730	+ 56	14	22,854	+ 832
Rotherham Corp.	,, 8	965	1,043	+ 78	14	14,406	+ 777
Salford Corporation	,, 6	5,358	5,490	+ 132	13½	73.929	+ 1,318
Sheffield Corporation	,, 5	7,542	7,899	+ 357	14½	112,534	+ 4,635
Southampton Corp.	,, 1	1,413	1,552	+ 139	13	13,269	+ 1,174
Southend-on-Sea Corp	,, 1	1,089	1,272	+ 183	14	13,698	+ 2,437
South Met. Trys.	,, 3	1,028	1,247	+ 219	27	29,251	+ 7,574
South Shields Corp.	,, 4	744	869	+ 125	13½	10,969	+ 1,362
Sunderland Corp.	,, 5	1.532	1,708	+ 176	14	20,805	+ 1,189
Sunderland District	,, 1	593	659	+ 66	35	20.449	+ 1,783
Swindon Corporation	,, 1	174	192	+ 18	13	2 378	+ 225
Torquay	,, 2	695	747	+ 52	26	13 761	+ 518
Trys. (M.E.T.) 'Buses	,, 4	5,826	10,454	+ 4,628	27	238.903	+ 174,011
TynesideTrys.&Tmrds	June 30	831	907	+ 77	26	15.545	+ 995
Wallasey Corporation	July 4	1,341	1 520	+ 179	13½	18 166	+ 1,460
Walsall Corporation	,, 4	644	665	+ 21	27	16.766	+ 893
Walthamstow U.D.C.	,, 4	790	945	+ 155	14	11.8 2	+ 1,474
Warrington Corp	June 25	444	431	— 13	13	5,433	— 93
West Ham Corporation	July 2	2,935	2 984	+ 99	13	38,813	+ 1,829
Wigan Corporation	,, 2	1,433	1 460	+ 27	13	20,406	+ 648
Wolverhampton Corp	,, 8	1,163	1.214	+ 51	15	15,940	+ 591
Yorkshire (W. Riding)	,, 5	1,432	1,456	+ 24	27	89.250	+ 1,151

* From such of the services as were working both last year and this year the receipts show an increase of £3,268 upon the week.

ELECTRIC RAILWAY TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	1914.	Incr. or Dec.	Aggregate. Wks.	1914.	Increase or Dec.
Central London	July 4	£4,777	£4,877	+ £100	27	£135,330	— £2,690
City and South London	,, 4	2,710	2 534	— 176	27	72,836	— 4,424
Liverpool Overhead	,, 5	1,858	1,783	— 75	27	45,243	+ 1,434
London Electric	,, 4	13,580	13,070	— 510	27	382,360	+ 1,990
Mersey	,, 4	2,147	2.070	— 77	27	60,588	+ 312
Metropolitan	,, 5	18,968	19,124	+ 156	27	492,999	+ 41,424
Metropolitan District	,, 4	13,488	13,107	— 381	27	355,443	+ 203

The Tramway & Railway World can be obtained, post free, at the following rates:—

For the United Kingdom—Twenty-five Shillings per annum (including 64 issues, of which 12 are large illustrated numbers). One Shilling per Single Copy.
For places abroad—Thirty Shillings per annum.

Tel. No.: 2948 Gerrard.
Telegraphic Address: "Tramigre," London.

AMBERLEY HOUSE, NORFOLK ST., W.C.

TRAMWAY AND OMNIBUS SHARE LIST.

Paid.		On Week	Quotations, July 10.
...	Alabama Trac. Ltg. Power Co. 5% 1st Mt. Gd. Bds.	— ½	65¼ — 68¼
5	Anglo-Argentine Trams. Co., Lim., 5½% Cum. 1st Pref	+ ⅛	4¾ — 5
5	Do. 5½% Cum. 2nd Pref.	— ⅛	4⅛ — 4¾
100	Do. 4% Deb. Stk. Red.	— 1	90 — 92
100	Do. 4½ Deb. Stk. Red.	...	96 — 99
100	Do. 5% Deb. Stk. Red.	+ ½	95 — 97
100	Auckland Elec. Trams Co. Ld. 5% 1st Mt. Db. Stk. Red	...	101 —104
1	Bath Electric Tramways, Lim. Pref. Ord	...	⅞ — 1
1	Do. 5% Cum. Pref	— 1/32	1/32 — 1/16 xd
100	Do. 4½% 1st. Mort. Deb. Stock, Red.	...	70 — 75
100	Birmingham Dis. Pwr. & Trac. Co. Ld. 4½% 1st Db. Stk.	+ ⅛	88 — 85
10	Blackpool and Fleetwood Tramroad Co.	...	14 — 15
	Bombay Elec. Supply and Trams. Co., Ord.	...	13½ — 14¼
10	Do. do. 6% Cum. Pref.	...	11 — 11¾
100	Do. do. 4½% Db. Stk Rd.	...	94 — 96
$100	Brazilian Traction Light and Power Co. Lim.	— 3½	74½ — 76½
5	Brisbane Elec. Trams. Investment Co., Ltd., Ord.	+ ⅛	7⅛ — 7⅜
5	Do. do. 5% Cum. Pref	...	4¾ — 5¼
100	Do. do. 4½% 1st Deb Stock, Red.	+ 1	99 —101
10	Bristol Tramways and Carriage Co.	...	6¾ — 7
10	Do. do. 4% Cum. Pref.	...	6⅞ — 7⅛
100	Do. do. 4% Deb. Stock	...	100 —102
100	Do. do. 4½% Deb. Stock	...	95 — 97
100	British Columbia Elec. Ry. Co., Lim., Def. Ord. Stck.	— 1	106 —110
100	Do. Pref. Ord. Stock	...	103 —107
100	Do. 5% Cum. Perpetual Pref. Stock	— 2½	102½ —105½
100	Do. 4½% 1st Mort. Debs.	...	98 — 101
40	Do. 4½% Vancouver Power Debs.	...	94 — 98
100	Do. 4½% Perpetual Cons. Deb. Stk.	...	95½ — 97½
100	British Elec. Traction Co., Lim., 6% Cum. Pref.	...	85 — 89
100	Do. 7% Non-Cum. Pref.	+ 1	54 — 57
10	Do. 6% Pref. Ord. Non-Cum.	+ 2½	16½ — 18½
100	Do. Deferred Ord. Stock	+ 4	10 — 12
100	Do. 5% Perpetual Debenture Stock	— 1	91 — 93
100	Do. 4½% Second Debenture Stock, Red	...	76 — 79
100	B. Aires Port & City Trms. 6% 1st Deb. Stk. Red.	...	73 — 78
1 00	Buenos Ayres Lacroze Trams. Co., Stg. 5% 1st Mrt. Deb.	— 1	99 —101
5	Calcutta Tramways Co., Limited, Ord.	+ ⅛	6¾ — 7⅛
5	Do do. 5% Cum. Pref.	+ ⅛	4⅞ — 5⅛
100	Do. do. 4 4% 1st Deb. Stock, Red.	...	97 — 100
1	Cape Electric Tramways, Ld.,	...	⅝ — ¾
10	Carthagena and Herrerias Steam Tramways Co., Lim.	...	2¾ — 3½
100	Do. 5% Debs. Red.	...	86 — 89
5	City of Buenos Ayres Trams. Co (1904), Lim.	+ ⅛	5¾ — 5¾
100	Do. 4% Debenture Stock Red, 1965	...	95 —100
100	Colombo Elec. Trys. and Ltg. Co. 5% 1st Mort. Deb.	...	91 — 95
100	Companhia Ferro Carril do Jardim Botanico, 5% 1st Mt.	...	91 — 94
10	Cork Electric Tramways and Lighting Co. 6% Cum. Pref.	...	— 7
10	Dublin United Trams. Co. (1896) Lim. Ord.	— ⅛	— 10¾
10	Do. do. 6% Pref.	— ⅛	— 12¾
100	Do. do. "A" Red.	— ½	— 80¾
100	Do. do. Deb. Stock "B" Red.	..	— 80
10	Gateshead & Dist Trys. Co., Ord.	...	8½ — 9
10/-	Hastings & Dist. Electric Trams. Co. Ld., Ord.	...	2⅞ — 3
1	Do. do. 6% Cum. Pref.	...	⅞ — 1
100	Do. do 4½% Deb. Stk. Red.	...	65 — 70
$1,000	Havana Electric Railway, Con. Mort. 5% Bonds	— 2½	91 — 95 xd
100	Hong Kong, Tramways Co., 5% Mort. Bds. (Regd.)	...	88½ — 87½
10	Imperial Tramways, Ord.	...	3 — 3½
10	Do. do. 6% Cum. Pref.	...	6¾ — 6¾
100	Do. do. 4½% Deb. Stock	...	74 — 76
5	Isle of Thanet Elec. Trams. & Ltg. Co., 6% Cum. Pref.	...	2 — 2¼
100	Do. 4% Debenture Stock	...	71 — 76
1	Kalgoorlie Elec. Trams., Ltd.	...	...
100	Do. do. 5% "A" Deb. Stk.	...	83 — 87
100	Do. do. 6% "B" do.	...	10 — 20
7/6	La Plata Elec. Trys. Co., Lim., 6% Cum. Pref.	...	⅜ — ⅝
10	Lanarkshire Tramways Co.	...	9½ — 10¾
100	Lancashire United Tramways, 5% Prior Lien Deb.	...	84½ — 86½
1	Lisbon Electric Trams., Lim., Ord.	...	1⅜ — 1⅝
1	Do. 6% Cum. Pref.	+ 1/32	1 — 1⅛
100	Do. 5% Mort. Debs.	...	92½ — 97½
1	London and Suburban Trac. Co., Lim., Ord.	...	1/32 — 3/32
100	London General Omnibus Company, Limited, 4½% Deb.	...	99 —101
100	Do. do. 5% Cum. Inc. Deb. Stk. Red.	...	88 — 91
100	London United Trms. (1901) Ltd., 4% 1st Mt. Deb. Stk. Red	...	54 — 58
100	Madras Electric Trams. (1904) Lim., 6% Cum. Pref.	...	4⅞ — 5¼
5	Do. do. 5% Deb. Stk., Red.	...	99 —101
100	Manaos Trys. & Ltg. Co., 5% 1st Debs., Red.	...	75½ — 73½
$100	Manila Electric R. R. and Lighting Corp. Capital Stk.	— 2	99 —103
$1,000	Do. do. 5% Bds.	...	98¾ —100¼
1	Mansfield and Dist. Trys. Ltd. 6% Cum. Pref.	...	1/16 — 1/8
100	Metropolitan Elec. Trms. Ltd. 4½% Deb Stock, Red.	— 1	84 — 87
100	Do. 5% Deb. Stock, Red.	...	85½ — 88½
100	Mexico Tramways Co. Common Stock	— ½	71 — 75
500	Do. Gen. Con. 1st Mort. Gld. Bond	...	80 — 84
100	Do. 6% 50-yr. Mort. Bonds	...	74 — 78
...	Michigan United Railways 5% 1st Mort. Gld. Bonds	...	90 — 92
100	Montreal Street Railway, Sterling 4½% Debs. (1922)	...	99 —101
100	Do. 4½% Sterling Debs. (1932)	...	98 —100
1	National Steam Car Co. Ltd.	— 1/32	1/16 — 3/16
10	Oldham—Ashton and Hyde Elec. Ord.	...	6 — 6¼
10	Do. do. 5% Cum. Pref.	...	5⅜ — 6⅛
5	Para Elec. Rlys. and Ltg. Co., Ord.	...	4 — 4½
5	Do. do. 6% Cum. Pref.	...	4 — 4½
1	Perth (W.A.) Elec Trams., Ld., Ord.	...	—
1	Potteries Electric Traction Co., Ltd., Ord.	...	1/32 — 1/16
1	Do. 5% Cum Pref.	...	1/16 — 3/32
100	Do. 4½% Debenture Stock, Red.	...	81¾ — 84¾
1	Provincial Tramways, Lim., Ord.	...	1/16 — 1/8
10	Do. 5% 1st Deb. Stock	...	98 —103
...	Puebla Tramway, Light & Power Co., Prior Lien 5%	— 2	69 — 74
5	Rangoon Elec Trams & Supply Co. 6% Cum. Pref.	+ 1/16	5 — 5¼
100	Do. do. 4½% 1st Mt. Db. Stk	...	94 — 96
100	Rhondda Tramways Co., 5% 1st. Mt. Debs.	...	87 — 89
$500	Rio de Janeiro Trys. Lgt & Pr. Co. 1st Mt. 30 yr, 5% Gd. Bds.	...	97½ — 99½
100	Do. do. 5% 5-yr. Mort. Gold Bonds	— 1	89 — 91
$500	Sao Paulo Tr. Light & Power, Co. 5% 1st Mort. Debs. 1928	...	97 —101
100	Do. do. 5% Perp. Cons. Debs.	+ 1	99 — 1 2
10	Shanghai Elec. Construction Co.	...	12½ — 13¼
100	Singapore Elec. Tramways Lim., 5% Debs. Red	...	88 — 93
	South Met. Elec. Trams. and Ltg. Co., 6% Cum Pref.	...	...
100	Do. do. 4% Deb. Stk.	...	64 — 68
...	Southern Elec. Trys. Co. of B.A., 5% 1st Mrt. Debs.	...	95 — 97
100	Toronto Railway Co., 1st Mt. 4½% Sterling Bonds	...	97 — 99
100	Toronto Suburban Ry. Co., 4½% 1st Mort. Deb. Stock	...	78 — 80
100	Tramways (M.E.T.) Omnibus Co., 4½% Gtd. Deb. Stk.	...	90 — 92
5	United Elec. Tramways of Monte Video, Ord.	...	4¼ — 4¾
5	Do. do. 6% Cum. Pref.	...	4⅝ — 5⅛
100	Do. do. 5% 1st Deb. Stk. Red.	+ ½	95 — 97
100	Winnipeg Elec. Ry. Co. 4½% Perp. Cons. Deb.	...	93½ — 95½
5	Yorkshire (West Riding) Elec. Trys. Co., Ord.	...	¼ — ½
5	Do do 6% Cum. Pref.	...	4 — 4¼
100	Do. do. 4½% 1st Deb. Stock. Red.	+ 1	84 — 87

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THE

Tramway & Railway World

Vol. XXXVI. No. 4.] LONDON, SATURDAY, JULY 18, 1914. [Established in 1892.

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Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than 3 p.m. on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

ASSAM BENGAL RAILWAY COMPANY, LTD.

The Assam Bengal Railway Company, Limited, is prepared to receive tenders for :—

1. Rails and Fish-Plates.
2. Coach Screws.

Specifications and tender forms may be obtained at the offices of the Company, Bishopsgate House, 80, Bishopsgate, E.C.

A fee of £1 1s. is charged for each specification, which cannot under any circumstances be returned.

Tenders must be delivered at the Company's office not later than noon on Tuesday, July 28, 1914.

Directors do not bind themselves to accept the lowest or any tender.

By order of the Board,
OSWALD I. MILNE,
Secretary.

COUNTY BOROUGH OF EASTBOURNE.

ELECTRICITY DEPARTMENT.

The Corporation invite tenders for the supply, delivery and erection at the Electricity Works of :—

A Main Machine and Feeder Switchboard.

Specification, drawing, form of tender and general conditions of contract may be obtained from the undersigned on and after July 20, 1914, on the payment of one guinea, which will be returned on receipt of a *bonâ-fide* tender.

Tenders, endorsed "Switchboard," to be received not later than the first post on August 18, 1914.

The Town Council do not bind themselves to accept the lowest or any tender.

J. KEMPE BRYDGES, M.I.E.E.,
Borough Electrical Engineer.

Electricity Works, Eastbourne.

ILFORD URBAN DISTRICT COUNCIL.

TRAMWAYS DEPARTMENT.

UNIFORM CLOTHING.

Tenders are invited for the supply of Uniform Clothing.

Forms of tender and conditions of contract may be obtained from Mr. L. E. Harvey, A.M.I.E.E., Tramways Manager and Engineer, Tramway Offices, Ley Street, Ilford.

Sealed tenders, endorsed "Tenders for Tramway Uniforms," to be delivered to me, the undersigned, on or before noon on Friday, July 31, 1914.

The Council does not bind itself to accept the lowest or any tender.

By order, ADAM PARTINGTON,
Clerk of the Council.

Town Hall, Ilford.

LEYTON URBAN DISTRICT COUNCIL.

ADVERTISING ON TRAMWAY CARS.

The Leyton Urban District Council are prepared to receive tenders for the exclusive right of Advertising upon the Tramway Cars of the Council for a period of five years from December 31, 1914.

Form of tender, conditions, and all other particulars can be obtained of Mr. F. Schofield, Tramways Manager, Tramways Office, Lea Bridge Road, Leyton, on and after July 20, 1914, between the hours of 9 and 4 (Saturdays 9 and 12).

Sealed tenders, endorsed "Tender for Advertising Rights on Tramway Cars," to be delivered at a meeting of the Council to be held on Tuesday, July 28, 1914, at the Town Hall, Leyton, at 7 o'clock p.m.

The Council do not bind themselves to accept the highest or any tender.

By order, R. VINCENT,
Clerk to the Council.

Town Hall, Leyton,
July 18, 1914.

LONDON—INDIA OFFICE.

The Secretary of State for India in Council is prepared to receive tenders from such persons as may be willing to supply :—

1. Road Bridges.
2. Railway Bridges.
3. Rails.
4. Fish-Plates.
5. Screwspikes.
6. Dogspikes.
7. Bearing Plates for Rails.

The conditions of contract may be obtained on application to the Director-General of Stores, India Office, Whitehall, S.W., and tenders are to be delivered at that Office by 2 o'clock p.m. on Tuesday, July 28, 1914, for Nos. 1 and 2, and on Tuesday, July 21, 1914, for the remainder, after which times respectively no tender will be received.

H. J. W. FRY,
Director-General of Stores.

India Office, Whitehall,
July 15, 1914.

SOUTH INDIAN RAILWAY COMPANY, LTD.

The South Indian Railway Company, Limited, are prepared to receive tenders for the supply of :—

Disc Wheels and Axles—Metre Gauge, 330 Pairs.
Broad Gauge, 734 Pairs.

Specifications and forms of tender may be obtained at the Company's offices.

Tenders, addressed to the Chairman and Directors of the South Indian Railway Company, Limited, marked "Tender for Disc Wheels and Axles," must be left with the undersigned not later than 1 o'clock on Wednesday, July 29, 1914.

The Company is not bound to accept the lowest or any tender.

A charge, which will not be returned, will be made of 40s. for each copy of the specification.

Copies of the drawings may be obtained on payment at the offices of Robert White, Esq., M.Inst.C.E., Consulting Engineer to the Company, 3, Victoria Street, Westminster, S.W.

By order, NEVILLE PRIESTLEY,
Managing Director.

Company's Offices, 91, York Street, Westminster, S.W.,
July 14, 1914.

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POSITIONS VACANT.

COUNTY BOROUGH OF NEWPORT.

ELECTRICITY AND TRAMWAYS DEPARTMENT.

TEST ROOM ASSISTANT AND METER MECHANIC.

Applications are invited for the above position. Applicants must have had good test room experience, and be fully competent to carry out general repairs. One with experience in C. and H. meters preferred.

Wages required to be stated by applicant.

Applications in candidate's own handwriting, together with copies of not more than three references, to be addressed and forwarded at once to the undersigned.

A. Nichols Moore, M.I.E.E.,
Borough Electrical Engineer.

Town Hall, Newport, Mon.,
July 13, 1914.

TRAMCAR FOREMAN.

Wanted—Mechanic as Tram-car Foreman (12 cars). Must be qualified in the upkeep of cars and overhead. Apply in writing, giving credentials and wages required, to General Manager, 6, Lord Street, Wrexham.

POSITION WANTED.

VEHICLE BUILDER.

To Tram, 'Bus, Public Service and Commercial Vehicle Builders, advertiser with exceptional experience as designer and constructor of steel and wood composite bodies is open to take situation as above. Box 34, The Tramway and Railway World, Amberley House, Norfolk Street, London, W.C.

BUSINESS FOR SALE.

GOOD OPENING FOR ENERGETIC MAN.—The business of the late Mr. George Conaty, 109, Colmore Row, Birmingham, is for Sale. It has been established six years, and has at present a fair amount of work in hand of a mechanical nature. Apply, Mrs. Conaty, Mayfield House, King's Heath, Birmingham.

SIMPLEX CONDUITS, Ltd.

GARRISON LANE, BIRMINGHAM.

Makers of Simplex Steel Conduit System and

WIRES and CABLES.
BITUMEN CABLES.
TRAMCAR HEATERS.
TRAMCAR METERS.
MEASURING INSTRUMENTS.
WATERTIGHT FITTINGS FOR CAR SHEDS.
ENCLOSED (Indicating) FUSES (to N.E. Code or English Standard).

500 page Catalogue sent free on request.

TRAMWAY SUPPLIES, Ltd.,

Tramway Engineers,

Sole Selling Agents for S. Dixon & Sons' Tramway Material,

160, WOODHOUSE LANE, LEEDS.

Sole Manufacturers of
TURNER'S PATENT AUTOMATIC POINT CONTROLLERS.

Telegrams: "Controllers, Leeds." Telephone: 3488 Leeds.
OVERHEAD LINE MATERIAL AND SUPPLIES.

POLE PAINTS

which keep their colour and prevent rust. Kearsley's ready-mixed Pole Paints are used by important Tramway Companies the world over, and give entirely satisfactory results under extreme climatic conditions.

Robert KEARSLEY & Co., Ltd.
RIPON, England.

MILLARS' TIMBER AND TRADING CO., LTD.
PINNERS' HALL, GREAT WINCHESTER STREET, LONDON, E.C.
SUPPLY
JARRAH
THE SANITARY WOOD PAVING

REGISTERED TRADE MARK

Telegrams: "Jarrah, London." Telephone: 368, London Wall.

SPECIAL
Car Varnish

for finishes of great durability and brilliant lasting lustre.

Sole Manufacturers:
PINCHIN, JOHNSON & Co, LTD.,
Minerva House, Bevis Marks,
LONDON,
E.C

THE BRITISH ACKLEY BRAKE AND SUPPLY CO., Ltd.,

WESTINGHOUSE BUILDINGS, NORFOLK STREET, LONDON, W.C.

Sole Licensors for the Manufacture of the Ackley "Adjustable" and "No Staff" Brakes in the United Kingdom, Norway, Sweden, Denmark, Belgium, Holland, and certain other territories.

The British ABCo TRADE MARK London.

Ackley Adjustable Brake.

Patented in all Countries. British Patents Issued in 1908, 1909.

Quick Operation. Powerful Application. Easy Installation.

Correspondents: ACKLEY BRAKE CO., 50, CHURCH STREET, NEW YORK.
Deutsche Ackley Bremsen Co., m.b.H. Charlottenburg 4-Berlin, Waitzstr. 7.
Cie. Francaise des Friens Ackley, 62, Rue St. Lazare, Paris.

BRANCH OFFICES AND AGENCIES Established at Brussels, Christiania, and Stockholm.

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THE
Tramway and Railway World

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THE TRAMWAY & RAILWAY WORLD PUBLISHING CO., Ltd.,
AMBERLEY HOUSE, NORFOLK STREET, LONDON, W.C.

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One Shilling per Single Copy.

FOR ALL PLACES ABROAD—Thirty Shillings per Annum.

SATURDAY, JULY 18, 1914.

THE "OCEAN"

ACCIDENT AND GUARANTEE CORPORATION, LTD.,

IS THE

PREMIER INSURER OF TRAMWAYS

HEAD OFFICE:

MOORGATE STREET, LONDON, E.C.

THE QUEUE SYSTEM.

Correspondence has taken place in London newspapers in favour of the institution of the queue as a means of avoiding the pushing that takes place among omnibus passengers at the busy hours. In Liverpool also it has been asserted that there is a good deal to be said for the argument that the absence of the queue is a blemish on the tramway system, particularly at the Pierhead. There are sufficient instances of the smooth working of queues for both tramway and omnibus traffic to justify their adoption elsewhere. In Bradford parallel railings are placed near the kerb at stopping places, and all passengers must file through them. Sheffield also has an admirable method of regulating the loading of the tramcars. In Birmingham the queue is enforced both for tramcar and omnibus passengers, and where necessary a police constable is stationed. Statements the reverse of progressive have been made on the subject by some London officials. It was only a few weeks ago that the Home Secretary, speaking in the House of Commons, declared that the police had no responsibility for traffic except from the point of view of safety. Yet the Superintendent of the Public Carriage Department has informed an interviewer that, although the pushing to gain admittance to omnibuses causes some unpleasantness at times, he does not think that it justifies the introduction of the queue. Further, he stated that constables who may be on duty near a busy stopping place have been instructed to prevent jostling and undue roughness, and that if extra men had to be put on to regulate omnibus passenger traffic Scotland Yard would never hear the last of complaints respecting the police rate. The question, however, is not so much a matter of extra police, but whether the men carry out the instruction. The performances of the police before Parliamentary Committees give rise to the suspicion that they have an unfounded prejudice against tramways, and it would undoubtedly be conducive to the public interest if the control of both tramway and omnibus traffic was transferred to the proposed Traffic Board. The Superintendent of the Public Carriage Department was silent upon the long-established custom of the police to regulate queues at theatres. A somewhat contradictory statement is attributed to an official of the London General Omnibus Company. While not admitting that there is need to regulate "the crowds of people boarding omnibuses," he acknowledged that "where roughness was known to occur the company made arrangements to have a special constable on duty." The successful efforts made two years ago, in the face of police opposition, by the London County Council to obtain from Parliament power to adopt queue regulations for the tramways, is sufficient testimony to the value of the system, which is shortly to be extended by the erection of a second covered queue on the Victoria Embankment. The Council were, no doubt, induced to obtain their statutory power by the circumstance that police-court proceedings arose out of one individual's resentment of the institution of an orderly method of filling the cars at one of the Thames bridges. Only a very short period was required to educate the public into recognising the advantages of the queue, and an excellent example of the system is to be seen in operation at Southwark Bridge for several services of cars. Single rows of iron posts have been erected at three or four places on the pavement, and at the busy hours a chain is run through them in order to guide people to the car platforms. Presumably, it is too much trouble for the police to undertake any experiment in the interest of omnibus passengers.

L.C.C. TRAMWAY MATTERS.

AXLE FORGINGS.

At Tuesday's meeting of the London County Council the Highways Committee reported that they had received the following tenders for steel axle forgings:—

	Prices each. 1 to Sketch 2613. £ s. d.	2 to Sketch A 546. £ s. d.
Steel, Peech and Tozer, Ltd.	2 8 0	1 16 3
Fried. Krupp Aktiengesellschaft, Germany	2 8 0	1 19 9
John Baker and Co. (Rotherham), Ltd.	2 11 6	2 1 6
Brown Bayley's Steel Works, Ltd.	2 12 6	2 0 0
Henry Bessemer and Co., Ltd.	2 12 6	2 2 6
W. J. Ritchie and Co.	2 12 0	2 14 0
Anger Mfg. and Supply Co.	2 12 6	2 14 6
Workington Iron and Steel Co., Ltd.	2 17 4	2 6 10
John Brown and Co., Ltd.	2 18 6	2 9 6
Glasgow Railway Engineering Co., Ltd.	3 0 0	2 10 0
Andrew Brown and Co.	3 10 3	2 16 3
John Spencer and Sons, Ltd.	3 10 0	3 12 0
Bochumer Verein für Bergbau	4 2 0	3 12 0
Vickers, Ltd.	4 3 0	3 7 6

The Committee's recommendation that the tender of Steel, Peech and Tozer, Limited, be accepted was adopted.

150 TRAILERS TO BE ORDERED.

The Council adopted the report of the Highways Committee recommending the purchase of 150 trail cars and the equipment of 200 cars as tractors, particulars of which were given in our last issue. The tender accepted was that of the Brush Electrical Engineering Company, the price for 150 trail cars being £74,200, including the equipment of the 200 cars as tractors. The expenditure of £80,250 will involve debt charges of £6,220 in the first year, decreasing by about £120 a year as the debt is paid off. The Highways Committee estimate that a trailer can be operated at a total cost of approximately £338 per car per year less than the cost of operating an ordinary electric car. The present car shed accommodation, which can at comparatively small cost be made available, is sufficient for the additional number of cars now proposed.

TRAFFIC ON THE VICTORIA EMBANKMENT.

Mr. G. H. Hume, refuting the suggestion that the cars run empty on the Embankment, said that as a result of special observation taken on May 18 last the number of passengers brought to the Embankment between 6 a.m. and midnight was 79,327. On the same period the number of passengers leaving the Embankment was 75,280.

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TRAMWAYS AND LIGHT RAILWAYS ASSOCIATION.

ANNUAL CONGRESS AT NEWCASTLE-ON-TYNE.

The sixth annual Congress of the Tramways and Light Railways Association was most successfully opened on Thursday morning at Newcastle-on-Tyne with a cordial welcome from the City Corporation to the two hundred members, delegates and visitors, who had assembled in the Connaught Hall. Admirable arrangements were made for their comfort by Alderman Rodgers, the chairman of the Tramways Committee, and Mr. R. R. Wedderburn, the Lord Mayor's secretary, while the organising work of the Congress was ably carried out by Mr. A. de Turckheim, secretary. The hospitality of the Corporation was greatly appreciated. Mr. Stephen Sellon, a vice-president, occupied the chair at the reception.

The LORD MAYOR (Councillor Johnstone Wallace) referred to the absence of Viscount Chilston, M.P., the President, through a sad bereavement, and a telegram of condolence was ordered to be sent. The Lord Mayor remarked that the tramways were the only municipalised public service in Newcastle. Of the 1¼ millions capital expended, nearly two-thirds had been repaid and £100,000 reserve fund had been accumulated. The system had not done badly, especially when it was remembered how far they took passengers for a penny, and that there were some halfpenny fares. The service was very satisfactory and of great use to the great working class population. His lordship attributed great credit for good management to the Tramways Committee, the chairman (Alderman Rodgers), and the vice-chairman (Councillor Mayne).

Mr. STEPHEN SELLON returned thanks for the welcome in the enforced absence of the President and the Hon. A. Stanley, and Mr. HARRY ENGLAND assured the Lord Mayor that members were looking forward to a thoroughly enjoyable visit. They were, he said, most gratified with the welcome accorded to them.

A telegram of congratulation was sent to Mr. Andrew Nance, general manager of Belfast Corporation tramways, on the attainment of the jubilee of his association with tramway work.

TRAMWAYS AND ROAD MAINTENANCE.

The secretary read a letter which had been sent to the Local Government Board asking that the Association might be heard by the Departmental Committee on Road Maintenance. A forty year old Act, the letter stated, compelled tramway undertakings to keep in repair where double lines exist practically the whole width of the road. The increase in traffic and the weight of motor vehicles resulted in a disastrous burden on tramways which imperilled the existence of small undertakings, while the larger ones experienced difficulty in maintaining their affairs in satisfactory condition.

NEWCASTLE-ON-TYNE TRAMWAYS.

Councillor R. MAYNE, J.P., vice-chairman of Newcastle Corporation tramways, submitted a paper entitled "Some Features of the Newcastle Corporation Tramways." The installation of the system had, he said, rejuvenated the face of the city by improvements and the substitution of wood paving for cobbles, the capital outlay of the tramways being debited to the extent of £150,000 towards the cost. Parallel lines extended from the central railway station in every direction, so that to walk from one line to the other rarely took five minutes. This, of course, meant a very great capital cost. The 62 miles of track had cost £1,256,052. The increase in cost made a difference of fares possible and proper, but the advantage obtained in taking every citizen nearer to his home was to be set against that difference. That the facilities were appreciated was evidenced by the fact that the population of 300,000 was carried 204 times over in the course of the year. The chief concern of the committee had been to secure financial soundness, and the first application of the annual surplus had been to the reserve and renewals fund, which was being kept at £100,000, payments only being made to relief of rates after replenishing this fund to the extent of the withdrawals made for renewals. About £2,000 per annum had been added to the receipts by a parcels service without any additional outlay. The halfpenny terminal fares in the city had quadrupled the takings on the last half-mile of the principal routes, but the same success had not attended the extension of the halfpenny fare on the inward and outward journeys to the city terminus at the Central Railway Station. This afforded a halfpenny fare in the centre of the city, but the loss of the penny fares had never been made up by a sufficient increase in the number of halfpenny fares.

Mr. R. HAMMOND (London) congratulated Newcastle upon the sound policy of their undertaking, and criticised workmen's fares as charity.

Mr. SHEPHERD (Edinburgh) said his company did not intend to carry workmen at a loss, and they were steadfastly opposed to halfpenny fares. The carrying of parcels on the Edinburgh cars, and delivery by special messengers, yielded a revenue of £6,000 per annum, half of which was profit.

Mr. G. W. HOLFORD (Salford) said the time had come for the levelling up of fares.

Mr. C. W. MALLINS (Liverpool) condemned halfpenny fares.

Alderman F. SMITH (Liverpool) characterised halfpenny fares and workmen's fares as arrangements for class benefit and vote catching. In Liverpool they provided a good service for a reasonable sum, and were not prepared to give halfpenny fares.

Mr. SAUNDERS (Maidstone) gave it as his experience that the institution of halfpenny fares had reduced revenue. The only concession tramway undertakings could give was in the nature of workmen's weekly tickets.

Alderman Rodgers said it had been stated that because Glasgow had halfpenny fares Newcastle should adopt them. The people at Glasgow had to take two cars to get round a corner, and the crowded conditions there could not be compared with Newcastle.

TRAMWAY EXPERIENCES IN BRAZIL.

The longest paper was that which bore the above title, its author being Mr. H. M. Sayers. He had been appointed chief engineer to a company operating the water, gas, electric and tramway undertakings, and he had the task of electrifying the second half of the mule tramways of Santos and Sao Vicente. In that work he had the aid of Mr. R. Leigh Griffin in immediate charge of track construction. The author kept the mule cars running, and completed the lines nine days before the expiry of the contract time of two years. He described the many difficulties that were encountered, including squalls from the sea, which gave much trouble with the various wires all carried on the tramway poles. Goods traffic gave a very good net revenue, and the author thought that it should be adopted in some British districts.

STANDARD TRAMWAY RAILS.

Mr. FRED BLAND presented under the above title a comparison between English and foreign sections, accompanied by a number of diagrams. The question of replacing certain of the British standard rails being now under consideration of the Engineering Standards Committee, the fact of extensive renewals of tracks now taking place in this and other countries, and the great movement that was being made towards standardisation, were the reasons that induced the author to place certain information before the Congress in the hope that it might be of assistance to them in their future decisions. In connection with the subject a report containing valuable information on the question of standardisation of points and crossings was now before the Engineering Standards Committee, which, it was hoped, would be shortly issued.

Votes of thanks were accorded to the authors of the papers. In the afternoon the Mayor and Corporation had arranged to give a garden party, but the weather caused its abandonment, and a visit to a picture theatre was substituted. Others visited the power station, car works, etc., under the guidance of Mr. E. Hatton, the general manager and engineer. Everywhere there was evidence of admirable equipment. The motor omnibus department gave indications that the general manager intends to take full advantage of the powers provided in the Bill now before Parliament.

The Corporation banquet at Tilley's Rooms was attended by a brilliant and representative gathering, the Lord Mayor being in the chair.—Alderman RODGERS proposing the toast of the evening, "The Tramways and Light Railways Association," said that in five years the Association had doubled in membership. It was open to all comers interested in tramways, and they united with all other bodies in protecting tramway undertakings generally.—Mr. STEPHEN SELLON replied, and described the Newcastle tramways as the finest in the country.—Councillor MAYNE proposed "Kindred Associations," and Alderman LINSLEY replied for the Municipal Tramways Association.—Mr. TEGETMEIER proposed "The Lord Mayor," and his lordship responded appreciatively.

CONSTRUCTION AND MAINTENANCE OF RAIL JOINTS.

Yesterday (Friday) Mr. R. HUMPHREYS, Birmingham and Midland Tramways Joint Committee, in a paper on the above subject, advocated welded joints with fish-plates. The support of the fish-plate enabled the weight of the passing car to be well transmitted from rail to rail, and if the fish-plate could be made to stay where it was placed, and the creep between the rail and the plate abolished, the joint would live as long as the rail. For some time past he had been carrying on useful work with the electric arc welding of fish-plates to rails. The paper gave illustrations of the system. Descriptions and illustrations were also given of the Thermit, cast weld, D.A., Tudor, and Lorain joints

TOWN PLANNING IN RELATION TO TRAMWAYS.

Mr. J. A. BRODIE, city engineer, Liverpool Corporation, submitted this paper. The councils of four large areas lying to the south of the city recognised that they could not deal with the question on a suitable scale except at great expense, and these districts had been included by agreement within the city on the understanding that proper schemes are to be prepared. In the town planning of the district lying to the south of the built-up area and within the city boundary it would probably be found that tramways would be required at a maximum distance apart of one thousand yards. Eighty feet might be looked upon as the minimum width to be adopted in any important main thoroughfare. Under a Liverpool Act of 1908 about twenty miles of roads varying in width from 72 feet to 120 feet had been constructed as new roads or as widenings of existing roads, principally on the outskirts. The author exhibited cross sections of two roads having widths of 114 feet and 120 feet respectively. Tramways had been laid down the centre of each road. the rails on the first mentioned road being laid on longitudinal concrete beams and the surface finished in pitch macadam. In the case of the 120 feet road the tramways were laid on wooden cross sleepers on a clinker foundation, over which soil was laid for grass. The roadways outside of the track were being laid with a clinker concrete foundation with macadam stone embedded in its upper surface, and the wearing surface was finished in pitch macadam. The cost of the latter tramway track showed a saving of approximately £6,000 per mile of double line of route. Tramway traffics were likely to suffer severely in future from the neglect of road widenings in the larger towns. He urged that the average speed should be increased to 20 m.p.h. by means of fenced in lines. If speeds were to be increased to enable tramways to compete wih other forms of passenger conveyance noise

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and vibration must be as far as possible eliminated. Towards this end he urged a study of the problems of an indiarubber tyre and the noise of the gears commonly used.

Mr. England presided at yesterday's meeting. A telegram was received from the Hon. A. Stanley, M.P., regretting that emergency business prevented him leaving London. There were good discussions on both of the papers, the speakers being Messrs. Coutts, Selion, Steele, Hogg, Robson, Jenell, Holford, Dugdale, Stutz, and Burnett. From Mr. Nance the following telegram was received :—"Please say a very grateful 'Thank you' for me to members of Association. No life more utterly claims the whole-hearted, unselfish and happy service of its men than that of the tramways officer." In the afternoon there was a trip on the Tyne, and last evening a supper and dance took place at Tilley's Rooms.

CROYDON AND OMNIBUS COMPETITION.

Mr. T. B. Goodyer's annual report on Croydon Corporation tramways was considered at the July meeting of the Council. The total revenue was £87,026, of which £84,926 was from traffic. The gross balance was £17,947, and the net balance £1,302. The gross receipts for the preceding two years were £92,404 and £94,430, and the working expenses for the same periods were £66,218 and £61,650, as against £69,743 last year. The gross balance was equal to 6.3 per cent. on the capital outlay, and, after payments of interest and sinking fund charges, etc., the net balance was equivalent to 4 per cent. The total capital expenditure stood at £284,847. The sum of £73,230 had been applied to the reduction of debt, equivalent to 25.71 per cent. The reserve and renewals fund amounted to £42,352. Compared with 1912-13, traffic receipts had decreased by £5,017, or 6.2 per cent.; miles run had increased by 150,371, or 5.68 per cent.; passengers carried had decreased by 1,276,265, or 6.22 per cent.; working expenses had increased by £3,525, or 5.32 per cent.; percentage of expenses to traffic receipts, 82.12 per cent. (an increase of 8.99 per cent.); gross balance had decreased by £9,206, or 33.9 per cent.; and the net balance had decreased by £9,454, or 89.3 per cent. The decreased net balance was due to the following causes :—Decrease in traffic receipts very largely attributable to the severe motor omnibus competition, and also to unfavourable weather conditions, £5,617; increased miles run, £687; increase in car repairs, £443; increase in power costs due to additional miles run, £1,662; increase in permanent way repairs, £649; increase in amount set aside for income-tax, £82; sundry increases (less decreases), £314; total, £9,454. The number of cars in stock was 75, and they were all in use at the Whitsuntide and August holiday periods. The average number run daily throughout the year was 59, an increase of one compared with the previous year, and on Saturdays and Sundays 67.5 compared with 64.5 on the same days in the preceding year.

The following summary shows the average number of omnibuses operating in the borough during the past year :—Quarter ended June 30, 1913, week-days 75, Sundays 144; September 30, week-days 96, Sundays 162; December 31, week-days 90, Sundays 144; March 31, 1914, week-days 85, Sundays 131. In order to meet to some extent the competition referred to a considerable increase in tram-car miles has been run. Out of every 20s. earned 7s. 10¾d. was spent in wages, and in addition 7.09 per cent. and 3.03 per cent. of the revenue earned was spent on repairs to permanent way and on rates and taxes respectively. No similar expenditure was incurred by motor omnibus operators in the borough. In June last Croydon Corporation unanimously adopted a resolution requesting the Government to pass such legislation as would place motor omnibus companies on terms of equality with regard to public obligations with the municipal tramways authorities in the metropolitan area. Mr. Goodyer communicated the resolution to a number of the managers of tramways in the metropolitan area, and the following tramway authorities had passed a similar resolution, viz. :—East Ham, West Ham, Bexley, Leyton, and Walthamstow.

Alderman Allen, in moving the adoption of the report, said the mileage increased by 150,000, and 1¼ million less passengers were carried. They could not expect that people who were going to London and wanted to get to the West End would think of riding in the cars and then entering the omnibuses, but in the borough they hoped that ratepayers would support their cars when travelling locally. It was hoped that the outcome of the appointment of a Select Committee, promised by the President of the Local Government Board, would be that heavy motors and omnibuses would pay a heavier duty. The report was adopted, Councillor Lighton speaking highly of the work of the manager.

THE POSITION AT WEST HAM.

For the year ended March 31 the income from the West Ham tramways exceeded the expenditure by £17,708, or £11,829 less than in the preceding year. After payment of the loan charges there was a net deficit of £14,422. The reserve and renewals fund stood at £32,740, and it had again been found necessary, the Treasurer states, to realise part of the investments to cover the cost of renewals. After these realisations the investments on March 31 last stood at £21,177. No part of the fund had been specifically earmarked as reserve, and the fund was not up to the 15 years' standard for renewals. The Tramways Committee proposed that a sum equal to a rate of 2d. in the £, be raised next September, and that £4,000, the balance of the deficit, be charged to the reserve and renewals fund. At a meeting of the Council on July 14 the committee's proposal was adopted.

PRIVATE BILL LEGISLATION.

NEWCASTLE-ON-TYNE CORPORATION.—This Bill, which passed the Commons on July 6, came before the examiners and was sent for second reading in the House of Lords.

NORWICH ELECTRIC TRAMWAYS.—This Bill was read a third time in the House of Lords on July 7.

OXFORD AND DISTRICT TRAMWAYS BILL.—Reference was made to this Bill in a leading article in our issue dated July 11. The measure provides for the confirmation of the agreement with the Corporation for the running of motor omnibuses, etc. It has been passed by the Committee on Unopposed Bills, but an agitation has been started with a view to inducing the House of Commons to reject the Bill on third reading. Although the agreement provides that in the event of general legislation the company's payment to the Corporation is to be increased (if necessary) to the amount which would then be payable, it is objected that the Oxford Company's monopoly would remain, while other municipalities would receive payment from motor omnibus undertakers and still retain their freedom of action.

PLYMOUTH, STONEHOUSE AND DEVONPORT.—The question of through running between Plymouth Corporation tramways and Devonport Tramways Company was raised again last Tuesday, when Mr. Mooney's Committee of the House of Commons entered upon the third week of their consideration of the Plymouth Council's Bill for the amalgamation of the three towns. By direction of the Speaker, Mr. E. R. Soames, a director of the Devonport Tramways Company, attended and was examined by Mr. Balfour Browne, who represented Devonport Council. He said he had carried on negotiations with Devonport Corporation through the Town Clerk for through running. His company favoured the project, and Devonport were in agreement. Asked if Plymouth had refused to come in, witness replied that what had happened in that connection had now become public property. In cross-examination by Mr. Lloyd, K.C., he said he regarded the terms upon which Devonport had agreed to through running as private, as they had not been ratified except by his company. In reply to the chairman, he said that one of the things he discussed with the Town Clerk was increased facilities and lower fares on one route.—Mr. Lloyd read a remark of the chairman of the company at the annual meeting, that if the amalgamation Order were confirmed it was hoped through running might become practicable.—Witness: I should imagine he meant public opinion had been so loudly expressed in favour of through running that whoever objected would be unable to prevent it.—Mr. Lloyd: Is Plymouth to have a profit in Devonport?—We have not arrived at that point. We made a suggestion for through running arrangements, each to take what they earn.—Mr. Lloyd: To what do you attribute the absence of through running?—To the relationships that existed between my company and Devonport and the relationship between my company and Plymouth.—Mr. Lloyd: Neither of them trust your company?—I cannot say. I don't know what you mean. On July 15 the Committee found the Bill proved and will report accordingly to the House.

WALSALL CORPORATION.—The Duke of Bedford's Committee on July 13 sent forward this Bill for report and third reading. Mr. Fitzgerald, K.C., for the Corporation, stated that when the Bill was before a Committee of the other House it was arranged that a sum of £255 per mile, or such other sum as should be settled by an arbitrator, should be contributed towards the reconstruction and maintenance of the trolley roads. The result of the decision of the other House was that if it became necessary to reconstruct the trolley route within two years the contribution should be £275, and this would give the county and Cannock authorities ⅜d. per mile run. They had agreed to make the clause applicable to motor omnibuses as well as railless trolley cars. The period for the reconstruction of the road was to be extended from two years to three years, and the clauses now submitted to their lordships were agreed clauses with their opponents. The contribution of ⅜d. will also be made in respect to a road and its approaches which the Midland Railway Company are under a statutory obligation to maintain.

MISCELLANEOUS NEWS AND NOTES.

Omnibuses for Torquay.—It is stated that the Torquay Tramways Company are about to institute services of road motor vehicles in districts not served by the tramways.

Bradford's New Railless Trolley Routes.—The railless trolley installation from Dudley Hill to Bankfoot is expected to be opened next week. Other routes are nearing completion.

Southend Corporation Omnibuses.—The tramways department have inaugurated omnibus services from the Kursaal to Westcliff. Tilling-Stevens and Straker-Squire single-deck vehicles are employed.

"Ediswan" Telephones and Accessories.—The eighth edition has been issued of the telephone and accessories catalogue of the Edison and Swan United Electric Light Company, Limited, Ponder's End, Middlesex. It is profusely illustrated.

Universal Early Morning Fare.—Brighton Council have reduced the tramway fares in any part of the borough to a penny up to 8 a.m. Hitherto the early cars have been run at a loss, and it is hoped that the reduced fare will alter this.

Drake and Gorham, Limited, have accepted the sole agency for Edison Accumulators, Limited, for Lancashire and Cheshire for commercial electric vehicles. Mr. T. H. Rigg, of the Edison Company, has joined Messrs. Drake and Gorham as departmental manager.

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Hastings Petrol-Electric Cars.—Twenty cars of the Hastings Tramways Company have been converted to petrol-electric working for service on the sea front. The cars were conveyed to Hastings by road from the works of W. A. Stevens, Limited, at Maidstone.

"Royal Ediswan" Drawn Wire Lamps.—The Glasgow Royal Hospital for Sick Children, which was opened by the King last week, is lighted throughout by "Royal Ediswan" drawn wire metal filament lamps. The quantity of lamps in use is nearly 2,000.

Automatic Point Controllers.—In his report for the past year Mr. T. B. Goodyer, general manager of Croydon tramways, states that at a cost of £110 13s. two automatic point controllers were installed at Thornton Heath Pond and the Norbury terminus respectively, and had worked very satisfactorily.

Southampton and Omnibuses.—The Tramways Committee recommended, on the advice of the manager, that three motor omnibuses should be used as feeders to the cars, and that a visit should be paid to towns where such vehicles are in use with a view to deciding the best type of omnibus to be adopted.

Burnley's Legislative Proposals.—The Council have called for a report on the advisability of applying for Parliamentary powers (a) to run motor omnibuses generally throughout the borough; (b) to run motor omnibuses along the present tramway routes outside the borough; and (c) to remove broken-down locomotives and other obstructions on the tramway lines and to recover the cost from the owners.

International Municipal Conference.—Among the subjects to be discussed at this conference at the Anglo-American Exposition, Shepherd's Bush, from July 20 to 25, will be municipal arrangements for the provision and control of traffic. The Mayors of many cities in the United States and the United Kingdom, together with municipal officers, will be present. The chairman of the Reception Committee is the Hon. Arthur Stanley, M.P.

Private Member's London Street Traffic Bill Introduced.—On July 16 Mr. Dickinson (L.) moved for leave to introduce a Bill to provide for the regulation of London street traffic on the lines suggested in the report of the Select Committee on Motor Traffic. Mr. Joynson-Hicks urged that it would be unfair that the traffic should be under the control of a body which was specially interested in the tramways. Leave was given, and the Bill was brought in and read a first time.

Another Tug-of-War Victory for Hull.—The tug-of-war team of the Hull tramwaymen on July 8 competed at the London United Tramway Company's sports and won the Lady Clifton Robinson challenge cup. Hull held the trophy in 1910 and 1912, the London United men having secured it in the year 1911. The Hull team were:—E. Barker, E. Hoth, J. Foster, F. Masterman, P. Kerens, T. Richards, W. Trowill, and H. Trowill. They were captained by their trainer, Inspector Carroll.

Yorkshire Electric Tramway Company's Employees.—Notwithstanding that the company last year voluntarily granted concessions amounting to £1,500, the tramwaymen soon afterwards joined a union. Now they have applied for further concessions. In an interview with them Mr. E. A. Paris, the local manager, proved to them that they were being treated as well as, or better than, men on surrounding undertakings. The running staff had uniforms, and the bonus system placed older employees on a footing with Leeds. As to the shareholders, they had only had two per cent. on their money so far. On July 13 Mr. Paris placed the application before the chairman of the company.

Croydon and Through Running.—The refusal of Croydon Corporation to undertake the outlay required to provide a sufficiency of more powerful tramway cars and to strengthen the track in order to accept the London County Council's proposal for through running was discussed at a second conference convened by the local Trades and Labour Representation Council. No decision on those points was arrived at, but a Labour member of the Tramways Committee stated that he had suggested that the difficulty could be overcome by the use of trail cars. It was suggested that if the cars had covered tops they could better compete with the omnibuses. Resolutions were passed asking for a trial of half-penny fares, the re-opening of the Whitehorse Road route, half fares for school children, the readjustment of workmen's fares more in accordance with the London County Council fares, and an extension of the Addiscombe route.

Engineers' Visit to Belfast Car Works.—Mr. Andrew Nance, C.E., general manager of Belfast tramways, on July 11 received a large party of members of the Belfast Association of Engineers at the tramway central depôt and car works. Mr. A. A. Blackburn, the chief engineer, gave a lecture on how Belfast motormen are trained, and the visitors were subsequently conducted to the car building department where a newly-completed car was much admired. Many of the appliances employed in connection with the repairs and maintenance were originally designed by Messrs. Blackburn and Vernon. The members and friends were afterwards entertained to tea by the general manager and Mrs. Nance. The latter was thanked for her hospitality, and Mr. Balfour Bramwell, in proposing a vote of thanks to Messrs. Nance, Blackburn, Vernon, and Williamson, and the other officers who had made the visit pleasant and instructive, said it was consoling to them all as ratepayers to know that their money was so carefully looked after, and all the officers, from Mr. Nance downwards, appeared to be loyal to each other. Mr. Nance, in reply, said it gave both himself and his officers great pleasure to show them some of the inner workings of their tramway system. Mr. Blackburn also responded.

Damages Against the Dublin Tramways Company.—Mr. James Kenna, a provision merchant of Dublin, was awarded at Nisi Prius damages to the amount of £550 against the Dublin United Tramways Company for personal injuries alleged to have been caused by the negligence of the defendants and their servants in the control of a tramway car on February 1 last. The defendants denied negligence, and asserted that the accident was due to unavoidable causes. Mr. Powell, K.C., for the plaintiff, said that he was travelling on a Dalkey tramcar carrying 39 passengers, which ran off the rails and overturned, when plaintiff was thrown into a heap of broken glass and was badly injured. The driver of the car stated that he was proceeding along Merrion Square at a speed of eight miles an hour, and at the top of Holles Hill he put on the track brake to see if the automatic point shifter would act. This failed apparently, and the car turned on to the Donnybrook line and was derailed. Sergeant Sullivan, for the defence, said that the occurrence was due to an accident which could not be foreseen. The point shifter had been thoroughly tried in many other places, and until the accident occurred had never been known to fail. When it failed the driver committed an error of judgment, and finding himself on the wrong line, he put on his brakes, and it was this that caused the car to overturn. Mr. G. M. Harris, electrical engineer to the Tramway Company, said that the points at the place were designed to make a straight road to Dalkey. The driver of the Donnybrook car had the means to set the points to enable him to make the turn, but they resumed their position automatically. He examined the points an hour after the accident, and found them in good order, and no repairs had been necessary since. A stay of execution for 14 days was granted.

CONTRACTS AND ORDERS.

Siemens Bros.' Dynamo Works have received an order from Bristol Tramways and Carriage Company for carbon filament lamps.

Edison Accumulators, Limited, have received an order for two electric omnibuses to act as feeders to South Shields Corporation tramways.

Leyland Motors, Limited, have received an order from the London County Council to supply an escape van similar to eleven vans for the Fire Brigade now on order from the company.

Wolverhampton Council have placed the following orders:—G. and J. Weir, turbine-driven feed pump; J. Spencer, Limited, steel and feed water piping; Dorman and Smith, switchboard alterations; Mossay and Co., for the supply of a Lloyd electric 2½-ton chassis on hire for three months at £42.

Southampton Council have placed a contract with the North Eastern Steel Company for 200 tons of tramway rails at £6 18s. per ton. Other tenders were from the Lorain Steel Company and Walter Scott, Limited, both at £7, Frank Mott at £6 14s. 3d. (three months' delivery), Dick, Kerr and Co. at £6 12s., and Barrow Haematite Steel Company, £6 10s. per ton (informal).

A. Starke and Company, Glasgow, who are doubling a portion of the Kingsthorpe section of the Northampton tramways, have made an offer to duplicate two further portions of that section, thus completing the double line from Regent's Square to the Cock Hotel. The charge would be an additional 8 per cent. on their schedule prices for the present work, the approximate additional amounts being £5,050 and £2,450, including Thermit joints. The Council on July 7 decided to offer a 5 per cent. increase, which proposal has been accepted.

PERSONAL.

Mr. H. Webber, tramways engineer and borough electrical engineer at Keighley, has been voted an increase of £25 in his salary.

Mr. Valentine Brown, general manager of La Plata Electric Tramways Company, has arrived in England, where he will stay until September.

Mr. E. Holt, tramways manager to Ashton-under-Lyme Council, has been recommended by the Tramways Committee for an increase of salary from £200 to £250.

Captain E. W. Morrison-Bell has been appointed a member of the Highways Committee of the London County Council in place of the late Sir Edward White.

Mr. S. Dean, secretary of the sick club of the South Lancashire Tramways Company, has been presented with a gold watch by the employees on the occasion of his appointment to an important post in a Liverpool firm.

Mr. E. Cross, tramways manager and electrical engineer to Rotherham Council, has been granted an increase in salary from £500 to a maximum of £600 by increments of £50 on January 1 next and January 1, 1917.

Councillor Harrison Barrow, chairman of Birmingham Tramways Committee, is to be requested by the City Council to allow himself to be nominated for the Lord Mayoralty on November 9 next. The Council have unanimously signed the requisition.

Mr. L. Parker, a member of the Isle of Thanet Electric Tramways staff, and secretary of the employees' sick benefit club, has been presented with a sideboard as a token of respect on the occasion of his marriage. Mr. J. A. Forde, the general manager, voiced the feelings of the employees.

Mr. A. Sedgwick Barnard, late borough electrical engineer at Walsall, has been presented with an inscribed solid silver salver by the Mayor and members of the Corporation as a token of esteem and regard. Mr. Barnard recently accepted an appointment with the Chloride Electrical Storage Company.

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Mr. W. Poole, who has been appointed assistant electrical engineer of the South Australian Government Railways, was formerly in the electrical engineer's department of the New South Wales Government Railways and Tramways. Lately he has been in the service of the Adelaide Tramways Trust.

West Ham Tramways Staff.—The general manager has reported that it will not be necessary at present to fill the vacancy caused by the resignation by Mr. R. O. Pickmere of the post of general engineering assistant. He recommends, however, that an increase of wages should be given to Mr. A. Beckwith, the foreman, for the additional duties that would devolve upon him.

Mr. T. J. Kendrew, general manager of Southport Corporation tramways, has been awarded an increase from £200 to £250 a year. It was stated at a meeting of the Council that during the year that Mr. Kendrew had held the position he had been given a free hand, and had proved his worth. There was formerly a loss on the tramways when amalgamated with the Electricity Committee. The gross tramway profits in 1913-14 amounted to £6,258, as against £4,634 in 1912-13.

FINANCIAL REPORTS AND MEETINGS.

Result of a Change of Policy at Burnley.—A balance of £25,367 was carried to the net revenue account as the result of the operation of the tramways in 1913-14, the expenditure being £62,948 and the receipts £88,316. Of the balance £7,687 was carried to the borough fund. The gross traffic receipts had increased by £25,441 or 41 per cent., compared with five years ago, while the car mileage had increased 525,587, or 43 per cent., and the route mileage 16 per cent. This very satisfactory growth of traffic continued, and there was no reason to doubt that the receipts without further increases of route or car mileage would exceed £90,000 during the present year. The car mileage showed a material increase owing to a change of policy. In past years the mileage had been restricted until the receipts per car mile in 1912-13 reached 13.18 per car mile. From June, 1913, a very much improved service was put into operation, and the bulk of the increased mileage was due to these better services. It was too soon to determine finally whether these should be permanent. The receipts per car mile were reduced to 12.04d., which was still above the average, showing more mileage was required. The increased expenditure exceeded the increased income by £5,092, owing to special circumstances. Included in the statistical information are the following items:—Passengers carried, 15,049,359 (increase 1,719,475); car miles run, 1,754,811 (increase 305,164); expenditure per car mile, 8.62d.; proportion of working expenses to receipts, 71.37 per cent. (increase 9.52 per cent.); number of cars available, 67 (increase 10); average number of cars in use for 19-hour day, 46 (increase six); and average working expenses per car mile, excluding power cost, 5.87d.

A Record Year at Brighton.—The accounts of the tramway undertaking show a revenue of £56,833 for the past year, and a balance of £14,397 carried to the net revenue account. The total revenue showed an increase of £3,039, and the working expenses (which include nearly the whole of the cost of renewals carried out during the year) an increase of £2,934. The surplus amounted to £842, as against £631 the previous year. Passengers numbered 11,839,515; the number of units of electricity used was 1,722,548; the number of units used per car mile, 1.49; percentage of working expenses to receipts, 74.66; average working expenses per car mile, 8.80d.; average total revenue per car mile, 11.79d.; average fare paid per passenger, 1.11d.; average number of passengers per car mile, 10. The total revenue increased by £2,820 and constituted the greatest year's takings since the undertaking has been in operation. During the August race week the number of cars was found to be quite inadequate, and the manager and engineer, Mr. W. Marsh, states that the three now being built will not be enough to make very much difference on the busy days in August. The number of tourist passengers was lower than it had been for six years, the counter attraction of the long distance country runs being too great. The issue of visitors tickets, giving for 6d., instead of 1s., a ride nearly as long as the tourist journey, may have been a factor in reducing the tourist passengers. On August 8 an arrangement was put in force for the issue of through tickets to and from the Devil's Dyke in connection with the Omnibus Company, and 7,412 passengers were carried. 1.49 miles of track was completely renewed. Heavy steel-tired steam lorries continued to play havoc with the soft-wood paving and cast-iron work forming the surface of the road.

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WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 60 of the principal undertakings of the United Kingdom for the week ended July 11, give total receipts of £253,369, or £11,047 more than in the corresponding week last year. The total length of track was 2,863 miles, or 24 more than for the corresponding week. Receipts were at the rate of £88 9s. 11d. per track mile, an increase of £3 2s. 10d. as compared with the corresponding week of last year.

THE BRITISH ELECTRICAL FEDERATION.

The traffic statement for the week ended July 10, 1914, shows that the receipts from tramways and railways amounted to £43,525 as compared with £41,439 in the corresponding week last year, and from omnibuses £17,784, as compared with £9,512, making a total of £61,309, as compared with £50,951. The tramway and railway route mileage was 429.82 as compared with 428.47. Upon such of the services as were working both last year and this year the receipts show an increase of £4,437 upon the week.

RAILWAYS OF THE UNITED KINGDOM.

The summary of the official traffic returns of the fifty principal railways of the United Kingdom for the week ended July 12 gives a total of £2,482,438, which was earned on 22,162 miles, being at the rate of £112 0s. 3d. per mile of line open. For the corresponding week of 1913 the receipts of the same lines amounted to £2,514,848, with 22,137 miles open, or £113 12s. per mile. There was thus a decrease of £32,410 in receipts, an increase of 25 in mileage, and a decrease of £1 11s. 9d. in receipts per mile. Thirty-six of the returns distinguish between the receipts from passenger and goods traffic, and these show an increase of £1,951 (or 5d. per mile) in the passenger receipts and a decrease of £32,348 (or £1 11s. per mile) in the receipts from goods traffic. The aggregate receipts of the fifty railways since the beginning of the year amounted to £62,602,726, in comparison with £63,045,638 last year, a decrease of £442,912.

COPPER AND ALUMINIUM MARKET.

July 17, 1914.

Messrs. Henry R. Merton and Co., Ltd., 2, Metal Exchange Buildings, Leadenhall Avenue, E.C., supply the following quotations of prices per ton:—

	Friday, July 17.	Last week.	A Year Ago.
	£ s. d.	£ s. d.	£ s. d.
Standard Copper (cash)	61 1 3	61 10 0	63 17 6
,, (three months)	61 11 3	61 17 6	63 12 6
Electrolytic Copper—bars or ingots	63 10 0	63 10 0	67 0 0
Aluminium—bars or ingots	83 0 0	83 0 0	89 0 0

COAL MARKET.

July 17, 1914.

Messrs. Locket and Judkins, of 3, Fenchurch Avenue, E.C., report as follows:—

	Friday, July 17.	Last week.	A Year Ago.	Two Years Ago.
London, free into barge in Thames—	s. d.	s. d.	s. d.	s. d.
Best Admiralty Welsh (large)	26 6	26 6	25 6	
Best Seconds	24 0	24 0	24 0	
Ordinary Drys	21 0	21 0	21 0	
Best Washed Nuts	21 0	20 0	21 0	
Best Washed Peas	19 6	19 6	19 6	No Quotations owing to transport workers' strike.
Cardiff, f.o.b.—				
Best Admiralty (large)	22 0	22 0	21 0	17 9
Best Seconds	19 6	19 6	19 6	17 0
Ordinary Drys	16 6	16 6	16 6	15 0
Best Washed Nuts	16 6	16 6	16 6	14 0
Best Washed Peas	15 0	15 0	15 0	12 6
Newcastle, f.o.b.—				
Best Steams	15 3	15 3	15 3	13 9
Best Seconds	12 0	14 0	13 6	11 9
Smalls	9 0	9 0	9 0	10 9

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Anglo-Argentine	July 8	£56,912	£53,771	27	£1,511,510	+ £2,817
Auckland (28 days)	June 5	20,007	20,919	49	247,311	+ 6,331
Ballarat and Bendigo	May 24	3,550	3,515	8	8,082	+ 116
Brazilian St. Rly. Mlrs	May	44,920	50,237	43	523,872	+ 76,626
Brazilian Traction	July 11	95,458	98,000	2	193,400	+ 4,378
Brisbane	June	25,013	28,590	25	168,975	+ 17,972
British Columbia $	May	701,991	678,314	47	8,128,904	+ 817,358
Buenos Aires Pt. & City	May	6,925	6,713	22	36,517	+ 3,206
Buenos Aires Lacroze	June	44,078	44,139	52	534,565	+ 5,988
Calcutta Rs.	July 11	66,954	70,336	27	18,74,156	+ 103,894
Cape Town	April	12,175	13,408	17	55,388	+ 8,926
Carthagena & Herreria	June	2,158	1,405	26	13,796	— 3,535
Cordoba	May	13,622	14,680	8	28,094	+ 1,448
East India	June	1,892	1,966	48	21,030	+ 809
Kalgoorlie	June	2,854	2,692	26	15,522	— 1,704
La Plata	June	4,846	4,561	26	29,244	— 2,328
Lima	May	32,256	33,150	22	173,754	+ 6,825
Lisbon Mlrs.	March	...	160,592	...	...	...
Madras (14 days) Rs.	July 15	23,492	32,189	27	377,858	+ 30,201
Manila	June	131,500	132,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	May	62,000	64,500	22	327,000	+ 3,000
Mexico $	May	595,795	592,275	22	2,933,032	+ 261,322
Montevideo	June	24,820	28,049	35	257,246	— 1,167
Para	June	25,373	20,914	30	150,423	— 30,495
Port Elizabeth	April	4,357	3,758	17	16,633	+ 245
Puebla $	May	61,400	65,300	22	328,800	+ 35,100
Rangoon	June	4,867	4,997	26	32,384	+ 982
Shanghai $	July 8	23,171	27,000	27	667,200	+ 95,729
Singapore $	July 11	12,338	12,860	27	333,918	+ 7,575
Toronto $	May	811,872	871,783	21	4,163,988	+ 323,708
Winnipeg $	May	326,827	357,664	21	1,756,539	+ 105,303

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TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	1914.	Incr. or Dec.	Aggregate. Wks.	1913-4.	Increase or Dec.
Aberdeen Corporation..	July 8	£1,570	£1,889	+ £319	5	£9,988	+ £952
Accrington Corp.....	,, 8	688	607	— 81	14	8,668	+ 416
Ayr Corporation	,, 11	420	490	+ 70	8	3,993	+ 303
Bath Electric	,, 8	1,286	1,305	+ 19	27	25,333	+ 1,925
Birkenhead Corp.	,, 12	1,613	1,297	— 316	14½	19,113	— 287
Birmingham Corp.	,, 11	11,521	13,007	+ 1,486	15	187,635	+ 16,650
Blackburn Corporation	,, 8	1,387	1,401	+ 14	15	21,891	+ 1,608
Blackpool Corporation	,, 9	3,165	3,062	— 103	15	25,784	+ 3,817
Bolton Corporation	,, 12	3,112	3,854	— 258	15	42,672	+ 1,842
Bournemouth Corp.....	,, 15	2,244	2,432	+ 188	15	32,760	+ 2,230
Bradford Corporation...	,, 11	5,988	6,427	+ 439	15	94,692	+ 5,823
Brighton Corporation..	,, 12	1,188	1,261	+ 73	14½	16,945	+ 1,480
Bristol	,, 10	9,704	9,925	+ 221	27½	229,894	+ 17,709
British Elec. Federatn.	,, 10	50,951	61,309	*	...	...	...
Burnley Corporation ..	,, 11	1,631	1,623	— 8	15	25,643	+ 882
Burton-on-Trent Corp.	,, 12	287	322	+ 35	15	4,524	+ 284
Bury Corporation.....	,, 12	1,518	1,446	— 72	14½	21,080	+ 544
Cardiff Corporation.....	,, 4	2,921	2,994	+ 73	13	39,641	+ 2,496
Chatham and District..	,, 9	988	1,071	+ 83	27	24,581	+ 459
Chesterfield Corp.	June 25	251	252	+ 1	12	3,519	+ 390
Colne Corporation	July 11	372	363	— 9	...	...	...
Cork Electric.....	,, 9	564	614	+ 50	27	13,457	+ 293
Croydon Corporation ..	,, 3	1,830	1,991	+ 161	13	24,780	+ 1,832
Darlington Corporation	,, 11	244	274	+ 30	15	3,938	+ 252
Derby Corporation	,, 11	986	1,087	+ 101	14½	15,524	+ 909
Dover Corporation	,, 11	269	296	+ 27	15	3,610	+ 142
Dublin & Lucan	,, 10	254	224	— 30	1½	224	— 30
Dublin United	,, 10	6,071	6,476	+ 405	27	158,018	— 3,092
Dundee City	,, 8	1,290	1,402	+ 122	7½	10,501	+ 311
East Ham Corporation ..	,, 11	921	1,142	+ 9	15	15,918	+ 966
Exeter Corporation	,, 10	377	386	+ 9	15	5,402	+ 384
Gearless Motor 'Buses.	,, 11	886	440	— 146	28	13,076	+ 7,664
Glasgow Corporation ...	,, 11	19,518	21,653	+ 2,135	6	129,485	+ 9,440
Glossop(U.Elec.Supply)	,, 11	134	132	— 2	28	3,476	— 86
Halifax Corporation ...	,, 7	2,142	2,288	+ 147	14	32,193	+ 1,962
Hastings & District.....	,, 8	1,151	1,160	+ 9	27	24,423	+ 401
Huddersfield Corp.	,, 11	2,126	2,469	+ 343	15	35,739	+ 3,904
Hull Corporation	,, 11	3,128	3,229	+ 101	15	47,510	+ 2,001
Ilford U.D.O.	,, 11	460	621	+ 161	14	8,012	+ 1,231
Ilkeston Corporation ...	,, 15	142	145	+ 3	15	2,067	+ 24
Ipswich Corporation ..	,, 11	498	536	+ 38	15	7,211	+ 629
Isle of Thanet	,, 11	1,815	1,835	+ 20	41	19,535	+ 877
Kilmarnock Corp.	,, 11	171	172	+ 1	8	1,440	— 49
Lanarkshire	,, 9	1,637	2,255	+ 618	27	53,007	+ 7,091
Lancashire United	,, 8	1,578	1,704	+ 126	27	44,623	+ 4,911
Leeds City	,, 11	8,250	8,916	+ 666	15	129,610	+ 5,681
Leicester Corporation...	,, 11	2,806	3,061	+ 255	28	80,635	+ 4,346
Leith Corporation	,, 11	756	851	+ 95	8	6,425	+ 272
Leyton U.D.O.	,, 9	1,328	1,475	+ 147	14	20,381	+ 1,058
Liverpool Corporation..	,, 11	17,097	13,922	— 3,175	27½	361,793	+ 13,290
Llandudno &Colwyn B.	,, 10	546	545	— 1	32	7,959	— 53
London County Council	,, 8	42,350	44,868	+ 2,518	14	629,227	+ 29,589
London Gnl. Omnibus..	,, 11	66,862	72,566	+ 5,704	28	1,760,660	+ 46,484
London United	,, 10	6,571	6,787	+ 216	28	170,535	+ 2,615
Lowestoft Corporation	,, 4	219	247	+ 28	39	7,414	+ 809
Maidstone Corporation	,, 9	202	257	+ 55	15	3,210	+ 237
Manchester Corp.	,, 11	18,056	18,830	+ 774	15	267,496	+ 8,910
Met. Elec. Trys.	,, 10	9,139	9,939	+ 800	28	253,051	+ 6,291
Nat. Steam Car Co.,Ld.	,, 14	3,424	4,928	+ 1,504	56	154,035	+ 62,574
Nelson Corporation.....	,, 11	212	189	— 23	14½	3,317	+ 110
N'castle-on-Tyne Corp.	,, 11	4,648	5,357	+ 709	15	79,960	+ 7,937
Newport (Mon.) Corp....	,, 11	772	878	+ 106	15	11,606	+ 12,484
New St. Helens & Dist..	,, 8	1,038	924	— 114	1	1,039	— 14
Northampton Corp	,, 10	576	606	+ 30	14½	8,783	+ 319
Nottingham Corp.	,, 9	3,394	3,790	+ 406	14½	51,236	+ 2,783
Oldham Corporation ...	,, 5	2,234	2,419	+ 185	15	34,581	+ 2,515
Portsmouth Corp.....	,, 11	2,585	2,877	+ 292	15	36 643	...
Preston Corporation ...	,, 8	1,145	918	+ 233	15	13,544	+ 170
Provincial	,, 11	2,302	2,442	+ 140	40	75,323	+ 4,392
Reading Corporation ...	,, 9	701	747	+ 46	14	10 537	+ 782
Rhondda.....	,, 9	1,199	1,248	+ 49	27	33,565	+ 1,801
Rochdale Corporation	,, 11	1,846	1,751	— 95	15	24,606	+ 830
Rotherham Corp.....	,, 15	970	1,055	+ 85	15	15,462	+ 963
Salford Corporation ...	,, 13	6,219	5,501	— 718	15	79,430	+ 600
Sheffield Corporation...	,, 12	7,519	7,975	+ 456	15½	124,115	+ 6,649
Southampton Corp.....	,, 8	1,354	1,386	+ 32	14	19,656	+ 1,207
Southend-on-Sea Corp.	,, 8	1,090	1,305	+ 215	15	15,094	+ 2,652
South Met. Trys.	,, 10	879	1,166	+ 287	28	30,397	+ 7,862
South Shields Corp.....	,, 11	734	867	+ 133	14½	11,886	+ 1,510
Sunderland Corp.....	,, 12	1,505	1,710	+ 205	15	22,515	+ 1,334
Sunderland District ...	,, 8	539	599	+ 60	36	21,048	+ 1,843
Swindon Corporation ...	,, 8	170	196	+ 26	14	2 575	+ 260
Torquay	,, 9	667	742	+ 75	27	14 504	+ 593
Trys. (M.E.T.) 'Buses	,, 11	5,815	9,385	+ 4,070	28	248.789	+ 178,082
TynesideTrys.&Tmrds	,, 8	505	571	+ 66	2	638	+ 9
Wallasey Corporation	,, 11	1,470	1,442	— 28	14½	19 608	+ 1,432
Walsall Corporation ...	,, 11	613	648	— 35	28	17.414	+ 418
Walthamstow U.D.O....	,, 11	711	855	+ 144	15	12,655	+ 1,618
Warrington Corp	June 25	444	431	— 13	12	5,433	— 93
West Ham Corporation	July 9	2,718	2,909	+ 191	14	41,752	+ 2,020
Wigan Corporation	,, 9	1,562	1,437	— 125	14	21,850	+ 536
Wolverhampton Corp	,, 15	1,139	1,187	+ 48	16	17.128	+ 640
Yorkshire (W. Riding)	,, 12	1,495	1,465	— 30	28	40.715	+ 1.124

* From such of the services as were working both last year and this year the receipts show an increase of £4,437 upon the week.

ELECTRIC RAILWAY TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	1914.	Incr. or Dec.	Aggregate. Wks.	1914.	Increase or Dec.
Central London.....	July 11	£4,508	£4,665	+ £157	28	£139,995	— £2,533
City and South London	,, 11	2,671	2.562	— 109	28	75.448	— 4 533
Liverpool Overhead.....	,, 12	2,379	1,741	— 638	28	47,984	+ 795
London Electric.....	,, 11	13,165	13,060	— 105	28	395.420	+ 1,885
Mersey	,, 11	2,491	2.101	— 390	28	62,689	— 78
Metropolitan	,, 12	19.359	19,571	+ 212	28	512,570	+ 41,636
Metropolitan District ..	,, 11	13.016	13,054	+ 38	28	368,487	+ 241

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TRAMWAY AND OMNIBUS SHARE LIST.

Paid.		On Week	Quotations, July 17.
...	Alabama Trac. Ltg. Power Co. 5% 1st Mt. Gd. Bds.	...	65½ — 68½
5	Anglo-Argentine Trams. Co., Lim., 5½% Cum. 1st Pref.	...	4¾ — 5
5	Do. 5½% Cum. 2nd Pref.	...	4½ — 4¾
100	Do. 4% Deb. Stk. Red.....	...	90 — 92
100	Do. 4½% Deb. Stk. Red.....	...	96 — 99
100	Do. 5% Deb. Stk. Red.....	...	95 — 97
100	Auckland Elec. Trams Co. Ld. 5% 1st Mt. Db. Stk. Red	...	101 —104
1	Bath Electric Tramways, Lim. Pref. Ord	...	7/8 — 15/16
1	Do. 5% Cum. Pref	...	15/16 — 1 1/16 xd
100	Do. 4½% 1st. Mort. Deb. Stock, Red.....	...	70 — 75
100	Birmingham Dis. Pwr. & Trac. Co. Ld. 4½% 1st Db. Stk.	+ 1	84 — 86
10	Blackpool and Fleetwood Tramroad Co.	...	14 — 15
	Bombay Elec. Supply and Trams. Co., Ord.	...	13½ — 14½
10	Do. do. 6% Cum. Pref.....	...	11 — 11¾
100	Do. do. 4½% Db. Stk Rd.	+ 1	95 — 97
$100	Brazilian Traction Light and Power Co. Lim.....	+ 1½	76 — 78
5	Brisbane Elec. Trams. Investment Co., Ltd., Ord.	+ ⅛	7¾ — 7¾
5	Do. do. 5% Cum. Pref	...	4¾ — 5¼
100	Do. do. 4½% 1st Deb Stock, Red. ...	+ 1½	100 —103
10	Bristol Tramways and Carriage Co.	...	6¾ — 7
10	Do. do. 4% Cum. Pref.	...	6⅞ — 7⅛
100	Do. do. 4% Deb. Stock	...	100 —102
100	Do. do. 4½% Deb. Stock	...	95 — 97
100	British Columbia Elec. Rly. Co., Lim., Def. Ord. Stck.	...	106 —110
100	Do. Pref. Ord. Stock	...	103 —107
100	Do. 5% Cum. Perpetual Pref. Stock.....	...	102½ —105½
100	Do. 4½% 1st Mort. Debs.	...	98 —101
40	Do. 4½% Vancouver Power Debs.....	— ⅛	92 — 96 xd
100	Do. 4½% Perpetual Cons. Deb. Stk.	+ ½	96 — 98
100	British Elec. Traction Co., Lim., 6% Cum. Pref.....	...	85 — 89
100	Do. 7% Non-Cum. Pref.	...	54 — 57
100	Do. 6% Pref. Ord. Non-Cum.	+ ½	17 — 19
100	Do. Deferred Ord. Stock	...	10 — 12
100	Do. 5% Perpetual Debenture Stock.....	...	91 — 93
100	Do. 4½% Second Debenture Stock, Red	...	76 — 79
100	B. Aires Port & City Trms. 6% 1st Deb. Stk. Red.	— 3	70 — 75
100	Buenos Ayres Lacrose Trams. Co., Stg. 6% 1st Mrt. Deb.	...	99 —101
5	Calcutta Tramways Co., Limited, Ord.	+ ⅜	7½ — 7⅝
5	Do do. 5% Cum. Pref.	...	4⅞ — 5⅛
100	Do. do. 4½% 1st Deb. Stock, Red.	+ 1	98 —101
1	Cape Electric Tramways, Ld., ...	...	⅝ — ¾
10	Carthagena and Herrerias Steam Tramways Co., Lim.	...	2¾ — 3¼
100	Do. 5% Debs. Red.	...	86 — 89
5	City of Buenos Ayres Trams. Co. (1904), Lim.	...	5¾ — 5¾
100	Do. 4% Debenture Stock Red, 1965	...	95 —100
100	Colombo Elec. Trys. and Ltg. Co. 5% 1st Mort. Deb. ...	...	91 — 95
100	Companhia Ferro Carril do Jardim Botanico, 5% 1st Mt.	+ ½	91½ — 94½
10	Cork Electric Tramways and Lighting Co. 5% Cum. Pref.	...	— 6⅝
10	Dublin United Trams. Co. (1896) Lim. Ord.	...	— 10⅝
10	Do. do. 6% Pref.	...	— 12⅝
100	Do. do. "A" Red.	...	— 80⅝
100	Do. do. Deb. Stock "B" Red. ...	...	— 79½
10	Gateshead & Dist Trys. Co., Ord.	...	8½ — 9
10/-	Hastings & Dist. Electric Trams. Co. Ld., Ord.	...	3/16 — 5/16
1	Do. do. 6% Cum. Pref.	...	3/16 — 5/16
100	Do. do 4½% Deb. Stk. Red.	...	65 — 70
$1,000	Havana Electric Railway, Con. Mort. 5% Bonds	...	91 — 95 xd
100	Hong Kong, Tramways Co., 5% Mort. Bds. (Regd.).....	+ 2	85 — 90
10	Imperial Tramways, Ord.	...	3 — 3½
10	Do. do. 6% Cum. Pref.....	...	6¼ — 6¾
100	Do. do. 4½% Deb. Stock	...	74 — 76
5	Isle of Thanet Elec. Trams. & Ltg. Co., 5% Cum. Pref....	...	2 — 2¼
100	Do. 4% Debenture Stock	...	71 — 76
1	Kalgoorlie Elec. Trams., Ltd.	...	...
100	Do. do. 5% "A" Deb. Stk.	...	82 — 87
100	Do. do. 6% "B" do.	...	10 — 20
7/6	La Plata Elec. Trys. Co., Lim., 6% Cum. Pref.....	...	3/16 — 5/16
10	Lanarkshire Tramways Co.	...	9⅛ — 10⅜
100	Lancashire United Tramways, 5% Prior Lien Deb.	...	84½ — 86½
1	Lisbon Electric Trams., Lim., Ord.....	...	1 1/32 — 1 3/32
1	Do. 6% Cum. Pref.	...	1 — 1¼
100	Do. 5% Mort. Debs.	...	92½ — 97½
1	London and Suburban Trac. Co., Lim., Ord.	...	1/16 — 3/32
100	London General Omnibus Company, Limited, 4½% Deb. ...	...	99 —101
100	Do. Do. 5% Cum. Inc. Deb. Stk. Red.	— 1	87 — 90
100	London United Trms.(1901) Ltd., 4% 1st Mt. Deb. Stk. Red	...	54 — 58
100	Madras Electric Trams. (1904) Lim., 6% Cum. Pref.....	...	4⅞ — 5¼
5	Do. do. 5% Deb. Stk., Red. ...	...	99 —101
100	Manaos Trys. & Ltg. Co., 5% 1st Debs., Red.	...	75½ — 78½
$100	Manila Electric R. R. and Lighting Corp. Capital Stk.	+ 1	100 —104
$1,000	Do. do. 5% Bds.	+ ½	99 —101
1	Mansfield and Dist. Trys. Ltd. 6% Cum. Pref.	...	1 1/16 — 1 3/16
100	Metropolitan Elec. Trms. Ltd., 4½% Deb. Stock, Red. ...	...	84 — 87
100	Do. 5% Deb. Stock, Red. ...	...	85½ — 88½
100	Mexico Tramways Co., Common Stock	+ 2	73 — 77
500	Do. Gen. Con. 1st Mort. Gld. Bonds	+ 3	83 — 87
100	Do. 6% 50-yr. Mort. Bonds	+ 3	76 — 80
...	Michigan United Railways 5% 1st Mort. Gld. Bonds ...	...	90 — 92
100	Montreal Street Railway, Sterling 4½% Debs. (1922).....	...	99 —101
100	Do. 4½% Sterling Debs, (1922) ...	...	98 —100
1	National Steam Car Co. Ltd.	— 1/16	1/16 — 3/16
10	Oldham—Ashton and Hyde Elec. Ord.	...	6 — 6¼
10	Do. do. 5% Cum. Pref.	...	5⅞ — 6⅛
5	Para Elec. Rlys. and Ltg. Co., Ord.	...	4 — 4½
5	Do. do. 6% Cum. Pref.	...	4 — 4½
1	Perth (W.A.) Elec. Trams., Ld., Ord.	...	...
1	Potteries Electric Traction Co., Ltd., Ord.	...	3/16 — 5/16
1	Do. 5% Cum. Pref.	...	1/2 — 5/8
100	Do. 4½% Debenture Stock, Red.	...	81½ — 84½
1	Provincial Tramways, Lim., Ord.	...	1/16 — 1/8
10	Do. 5% 1st Deb. Stock	...	98 —103
...	Puebla Tramway, Light & Power Co., Prior Lien 5%..	...	69 — 74
5	Rangoon Elec. Trams. & Supply Co., 6% Cum. Pref.....	...	5 — 5¼
100	Do. do. 4½% 1st Mt. Db. Stk	...	94 — 96
100	Rhondda Tramways Co., 5% 1st. Mt. Debs.	...	87 — 89
$500	Rio de Janeiro Trys. Lgt & Pr. Co. 1st Mt. 30-yr. 5% Gd. Bds.	— 1	96½ — 98½
100	Do. do. 5% 50-yr. Mort. Gold Bonds	...	89 — 91
$500	Sao Paulo Tr. Light & Power, Co. 5% 1st Mort. Debs.. 1929	...	97 —101
100	Do. do. 5% Perp. Cons. Debs....	— 1	98 —101
10	Shanghai Elec. Construction Co.	...	12½ — 13½
100	Singapore Elec. Tramways Lim., 5% Debs. Red	...	88 — 92
	South Met. Elec. Trams. and Ltg. Co., 6% Cum. Pref. ...	...	...
100	Do. do. 4% Deb. Stk.....	...	64 — 68
...	Southern Elec. Trys. Co. of B.A., 5% 1st Mrt. Debs.	+ 2	97 — 99
100	Toronto Railway Co., 1st Mt. 4½% Sterling Bonds	...	97 — 99
100	Toronto Suburban Rly. Co., 4½% 1st Mort. Deb. Stock	...	78 — 80
100	Tramways (M.E.T.) Omnibus Co., 4½% Gtd. Deb. Stk.	...	90 — 92
5	United Elec. Tramways of Monte Video, Ord.	...	4¼ — 4¾
5	Do. do. 6% Cum. Pref.	...	4⅝ — 5⅛
100	Do. do. 5% 1st Deb. Stk. Red.	...	95 — 97
100	Winnipeg Elec. Rly. Co. 4½% Perp. Cons. Deb.	...	93¾ — 95¾
5	Yorkshire (West Riding) Elec. Trys. Co., Ord.	...	⅜ — ½
5	Do. do. 6% Cum. Pref.....	+ ⅛	4⅞ — 4¾
100	Do. do. 4½% 1st Deb. Stock. Red.....	...	84 — 87

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THE

Tramway & Railway World

Vol. XXXVI. No. 5.] LONDON, SATURDAY, JULY 25, 1914. [Established in 1892.

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NOTICES.

All Communications and Advertisements for next week's issue should be received not later than 3 p.m. on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

COUNTY BOROUGH OF EASTBOURNE.

ELECTRICITY DEPARTMENT.

The Corporation invite tenders for the supply, delivery and erection at the Electricity Works of :—

A Main Machine and Feeder Switchboard.

Specification, drawing, form of tender and general conditions of contract may be obtained from the undersigned on and after July 20, 1914, on the payment of one guinea, which will be returned on receipt of a *bond-fide* tender.

Tenders, endorsed "Switchboard," to be received not later than the first post on August 18, 1914.

The Town Council do not bind themselves to accept the lowest or any tender.

J. KEMPE BRYDGES, M.I.E.E.,
Borough Electrical Engineer.

Electricity Works, Eastbourne.

MATLOCK URBAN DISTRICT COUNCIL.

TRAMWAY CABLE.

The above Council are prepared to receive tenders for about 1,967 Lineal Yards of Patent Steel Wire Tramway Cable with manila core (3¼in. in circumference) delivered at their depôt, Matlock, carriage paid.

Particulars, specifications, and terms as to payment may be obtained from Mr. C. P. Foster, Tramway Manager.

Tenders, accompanied by samples of wires, to be delivered at my office (marked "Cable") not later than 12 noon on Saturday, August 8, 1914.

The Council do not bind themselves to accept the lowest or any tender.

R. TAYLOR,
Clerk to the Council.

Town Hall, Matlock,
June 21, 1914.

MANCHESTER CORPORATION.

TRAMCAR LIFTING JACKS.

Manufacturers and others are invited to forward specifications and samples of Tramcar Lifting Jacks suitable for lifting four-wheeled cars and bogie cars.

Specifications are to be addressed to J. M. McElroy, General Manager, Corporation Tramways, 55, Piccadilly, Manchester, and samples forwarded to the Rolling Stock Superintendent, Tramways Depôt, Hyde Road, Ardwick, Manchester, and must be received not later than the 1st proximo.

COUNTY BOROUGH OF BIRKENHEAD.

ELECTRICITY DEPARTMENT.

The Corporation of Birkenhead invite tenders for supplying, delivering, and erecting One Open Type Water-Cooling Tower, of a capacity of 100,000 gallons per hour.

Specification, plan of site, form of tender, and general conditions may be obtained on application to the Borough Electrical Engineer, Mr. G. P. Shallcross, Corporation Electricity Works, Craven Street, Birkenhead, on payment of a fee of £1 1s., which will be returned on receipt by the Corporation of a *bona-fide* tender.

Tenders, which must be on the form supplied, sealed and endorsed "Tender for Cooling Tower, Electricity Department," must be sent in to me not later than 9 a.m. on Monday, August 10, 1914.

Parties whose tenders may be accepted will be required to enter into a contract containing a clause as to the payment of the rate of wages and observance of the hours of labour and conditions recognised and agreed upon between the trade unions and the employers in Birkenhead, or in the locality in which the work for carrying out the contract is executed, as the case may be.

The Corporation do not bind themselves to accept the lowest or any tender.

By Order, JAMES FEARNLEY,
Town Clerk.

Town Hall, Birkenhead,
July 22, 1914.

COUNTY BOROUGH OF OLDHAM.

ELECTRICITY WORKS.

The Oldham Corporation Electricity Committee invite tenders for the supply, delivery, and erection of :—One Direct Current Motor Generator. Extension to Extra High Tension Switchboard.

Copies of the specification, prepared by Mr. Robert Blackmore, A.M.I.E.E., can be obtained from the Engineer, Electricity Works, Oldham, on payment of two guineas, to be returned by the Corporation on receipt of a *bona-fide* tender.

The Corporation do not bind themselves to accept the lowest or any tender.

Tenders must be sent to the Engineer at the above address on or before August 16, 1914.

J. H. HALLSWORTH,
Town Clerk.

Town Hall, Oldham,
July 22, 1914.

SOUTH INDIAN RAILWAY COMPANY, LTD.

The South Indian Railway Company, Limited, are prepared to receive tenders for the supply of :—

Disc Wheels and Axles—Metre Gauge, 330 Pairs.
Broad Gauge, 734 Pairs.

Specifications and forms of tender may be obtained at the Company's offices.

Tenders, addressed to the Chairman and Directors of the South Indian Railway Company, Limited, marked "Tender for Disc Wheels and Axles," must be left with the undersigned not later than 1 o'clock on Wednesday, July 29, 1914.

The Company is not bound to accept the lowest or any tender.

A charge, which will not be returned, will be made of 40s. for each copy of the specification.

Copies of the drawings may be obtained on payment at the offices of Robert White, Esq., M.Inst.C.E., Consulting Engineer to the Company, 3, Victoria Street, Westminster, S.W.

By order, NEVILLE PRIESTLEY,
Managing Director.

Company's Offices, 91, York Street, Westminster, S.W.,
July 14, 1914.

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STALYBRIDGE, HYDE, MOSSLEY AND DUKINFIELD TRAMWAYS AND ELECTRICITY BOARD.

The Generating Station Committee of the above Board are prepared to receive tenders for the supply and delivery of E. H. T. three-core, lead-covered Paper Insulated Cable.

Specification and form of tender can be obtained at the Generating Station, Stalybridge.

ROBERT BLACKMORE,
Engineer-in-Chief.

Stalybridge, Hyde, Mossley and Dukinfield
Tramways and Electricity Board,
July 22, 1914.

POSITION VACANT.

TRAMCAR FOREMAN.

Wanted—Mechanic as Tram-car Foreman (12 cars). Must be qualified in the upkeep of cars and overhead. Apply in writing, giving credentials and wages required, to General Manager, 6, Lord Street, Wrexham.

POSITION WANTED.

VEHICLE BUILDER.

To Tram, 'Bus, Public Service and Commercial Vehicle Builders, advertiser with exceptional experience as designer and constructor of steel and wood composite bodies is open to take situation as above. Box 34, THE TRAMWAY AND RAILWAY WORLD, Amberley House, Norfolk Street, London, W.C.

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WITH MOTOR TRAFFIC SECTION.
Complete with Title-Page and Index.
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VOL. XXXIV., JULY —DECEMBER, 1913
(Price 10 Shillings each)

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ENCLOSED (Indicating) FUSES (to N.E. Code or English Standard).
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REGISTERED TRADE MARK. M.J.
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Telegrams: "JARRAH, LONDON." Telephone: 368, LONDON WALL.

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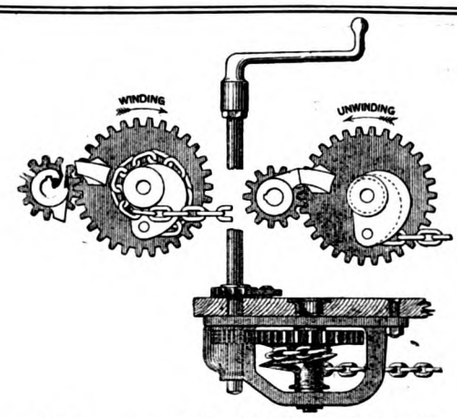

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(PATENT).
Note the simplicity of the Radial Contact pieces which render this the quickest of all geared hand brakes by
(1) Preventing the drum from over-running on release;
(2) Stopping the drum always at the point from which recovery of chain is most rapid;
(3) Eliminating all idle turning of the handle.
THE "PEACOCK" BRAKE CO., 27, CLEMENTS LANE, LONDON, E.C.

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THE
Tramway AND Railway World

Established in 1892 and Published by

THE TRAMWAY & RAILWAY WORLD PUBLISHING CO., Ltd.,
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One Shilling per Single Copy.

FOR ALL PLACES ABROAD—Thirty Shillings per Annum.

SATURDAY, JULY 25, 1914.

THE "OCEAN"

ACCIDENT AND GUARANTEE CORPORATION, LTD.,

IS THE

PREMIER INSURER OF TRAMWAYS

HEAD OFFICE:

MOORGATE STREET, LONDON, E.C.

VENTILATION.

With the atmospheric condition of the upper compartment of a top-covered car during the many hot days of this summer no fault is to be found; indeed, it may be described as providing the ideal means of keeping the perspiring passenger cool, and as far preferable to the open top deck of the uncovered car or motor omnibus, which has no overhead protection from the sun. Sufficient experience has been gained with the movable windows of the top-covered car to enable the management to issue such instructions to conductors as enable them to manipulate the windows to suit the various atmospheric conditions. It is to that experience that the absence of complaints is due. In the case of the lower saloon, it is to be regretted that progress in so important a matter as ventilation is conspicuous by its absence as regards the great majority of existing and new rolling stock. What are termed the ventilating lights are quite inadequate not only during the summer but in winter on occasions when excess passengers are permitted to stand. Matters are only slightly improved by letting down for a quarter of its length the one window facing the platform. It is impossible to lower it further without creating an unpleasant draught. That some additional ventilation is necessary is known to everyone concerned with car design, and it was recently proved again by an incident that occurred at Hull. A member of the Tramways Committee having, at a meeting of the Council, suggested that in hot weather the door at the motorman's end should be opened, the Lord Mayor and chairman of the Committee mentioned that he was recently a passenger in a crowded car, when he instructed the driver to open the door. Within three minutes the ladies were complaining of the draught and threatening to leave the car. The Lord Mayor added that the attention of the engineer and manager should be called to the matter. Similar incidents often occur on other tramway systems. In many towns it appears to be left to the conductors to use their discretion as to whether the door shall be opened, but they are instructed to close it if complaints are made by one or more passengers. It cannot be denied that the open door does create too great a current of air to be comfortable to many passengers, and it would not be surprising to learn that some of the motormen are also opposed to the door being opened, on the ground that the draught gives rise to lumbago. A similar objection has been taken to some forms of vestibules, and indeed in the current issue of the organ of one of the men's unions a warning is given to London drivers and conductors who have the door open in hot weather to beware of lumbago and sciatica. One means of keeping the interior cool is by the provision of sun blinds. On some undertakings curtains seem to have been removed, on the ground that they harbour dust, and no other form of blind has been substituted. The most sanitary description of blind would appear to be the spring-roller appliance made of leather. There ought to be little difficulty in designing an adequately ventilated lower saloon. As a matter of fact, it is already provided in one of the types of cars running in London. In place of four solid side windows, this car has the end light on each side divided into two. These are lowered to any position by means of springs, and there is no rattle, while the air can be kept fresh in the most oppressive weather.

TRAMWAY PROGRESS.

Although the weather did not favour the congress of the Tramway and Light Railway Association at Newcastle last week, in every other respect the meeting was gratifying to members and guests. The importance which now attaches to these gatherings is indicated by the large amount of space devoted by the electrical newspapers to the proceedings. *The Electrician,* for instance, gives a long account, filling some twelve pages. In addition, matter of interest in the purely electrical field being, apparently, impossible of discovery, it devotes its sole leader to a review of the paper on "rail joints." Another editorial animadverts on the somnolence of tramway administrators in promoting the developments of tramways. There was a time when tramway interests had no more hostile opponents than some representatives of the electrical press, but those days are happily long since passed, and it is gratifying that it should now be recognised that traction work is essential to the welfare of the electrical industry. No one denies that tramways need the support of everyone in any way interested in them; but the position is by no means so depressing as our contemporary imagines. The position, indeed, justifies the optimism that pervaded the meeting at Newcastle. At length we are on the eve of developments which will, to some extent at least, equalise the competition between the tramcar and the motor omnibus. The critical point in that competition has been passed. Nothing cheaper than "a metal wheel on a metal rail" has yet been found, and with a fairer field the tramway will be found to hold its own. Then, too, we may look forward, as Mr. Brodie does in his encouraging paper on town planning, to greater speeds on tramways than are now permitted. This will add immensely to their usefulness, which has been so much retarded in this country by mistaken fears for public safety. As regards this matter, motor traffic

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has undoubtedly been of great advantage to tramways. It has accustomed the pedestrian to vehicular speeds that ten years ago would have shocked the community; would, in fact, not have been tolerated for a moment. Yet to-day they are accepted as safe and necessary so far as motor vehicles are concerned. It is only the tramway which is still trammelled by antiquated restrictions. And here tramway men may, perhaps, be accused of somnolence. There is no good reason why more urgent steps should not be taken to bring about the much-needed reform. It is unfortunate that a little more thought is not bestowed on the arrangement of the programmes of tramway conferences. A popular alderman at the Newcastle conferences said he was using it for the benefit of his constituents—in other words, to create a right public opinion. That is exactly what tramway conferences should be used for, and if the councils would bear this in mind in selecting subjects for discussion the results would be of more practical utility.

PRIVATE BILL LEGISLATION.

LONDON UNITED TRAMWAYS COMPANY.—This Bill was read a third time and passed in the House of Lords on July 13, and it now awaits the Royal Assent.

MANCHESTER CORPORATION.—Among the provisions of this Bill, which came before a House of Commons Committee on July 16 were clauses relating to tramways, motor omnibuses and hackney carriages. Mr. J. M. McElroy, general manager of the tramways, said clause 27 asked for an extension of time in which to construct certain pieces of tramway which had not yet been constructed for the reason that certain of the districts required development before it would be prudent or judicious to go to the expense of laying down a tramway.—Mr. Ingleby (a member of the committee): Are you taking powers to extend the time to build these tramways and then not going to construct them?—Mr. Tyldesley Jones said that under their existing powers the Corporation were running motor omnibuses on contemplated tramway routes, and they could only run the omnibuses on those routes and not on the roads in the neighbourhood.—Mr. Ingleby said the committee would desire to be sure that it was the intention to construct before they gave the extension. —On July 21 Mr. McElroy, in cross-examination, said in consequence of complaints the Watch Committee requested the Tramway Committee a few years ago to discontinue the running of the old omnibuses weighing five tons. The Council had now put on a more up-to-date type, which weighed 3½ tons. They asked for powers to run anywhere in the city and along the tramway routes outside when they owned the lines. Referring to the petition of the goods and parcels carriers, he said the Corporation wished to carry parcels by the omnibuses. They intended to manufacture the bodies of the omnibuses.—Mr. Macassey, for the Great Central Railway, asked that the Corporation should compensate them if, as the result of running omnibuses over their bridges and approaches, they required to be strengthened.—Mr. McElroy said the railway companies had the full use of the roads belonging to the Corporation, and to put a charge on the latter for the use of roads over bridges would be unfair.—Other witnesses included the chairman of the Watch Committee, who said that an applicant was granted two omnibus licenses, and ten more were afterwards applied for. The applicant was asked to produce the vehicles, but he only produced the two. After devoting nearly two days to hearing the opposition by local carriers and by an individual who had applied for 110 licenses for omnibuses from Manchester and Stretford Councils, the committee granted powers to run omnibuses within the city, and also by consent outside, to carry parcels not exceeding 56 lbs. in weight and to manufacture the motor omnibuses. The application of the railway companies for contributions to the maintenance of roads and bridges will be considered next Tuesday.

MIDDLESEX COUNTY COUNCIL.—In the House of Lords on July 20 after the Middlesex County Council (Western Road) Bill had been read a third time, Lord Montagu moved to leave out clause 24, which imposes a charge of ¾d. per mile for road upkeep on motor omnibuses using the road. If the question were dealt with at all it should be by general legislation. The Road Board, of which he is a member, had given £400,000 towards the cost of the road, and they were surprised when they found that both Houses had passed this clause. A curious anomaly was that there was to be no charge on traction engines and heavy lorries with steel tires.—The Duke of Bedford, chairman of the Lords' Committee, remarked that enormous damage was done by motor omnibuses, and they got on to the roads on conditions extraordinarily favourable to themselves. Tramway undertakings had to apply for powers, and Parliament imposed special conditions on them.—Viscount Peel supported the clause as a protest against the way in which the omnibuses were allowed to roam freely over the whole country.—Earl Russell opposed the clause, and Lord Barnard pointed out that there were some twenty other Acts, passed or being passed, dealing with the subject. No time should be lost in regard to the Joint Committee which was to inquire into this subject getting to work.—Lord Strachie said there was precedent for the clause. To a large extent this traffic was pleasure traffic. He suggested that Lord Montagu should withdraw his amendment, pending the inquiry of the Joint Committee. If there was any legislation altering or abolishing the charge proposed, it could be applied to the Act.—Lord Donoughmore having remarked that the question was whether vehicles which made a profit out of the roads should not give a contribution to the cost of their upkeep, Lord Montagu withdrew his amendment, and the Bill was read a third time and passed.

NEWCASTLE-ON-TYNE CORPORATION.—This Bill, which has passed the House of Commons, came before a Committee of the House of Lords on July 23 and 24, when the further consideration was adjourned until Monday next. Powers are sought to construct new tramways and to run motor omnibuses in districts outside the city.

OXFORD TRAMWAYS COMPANY.—In the House of Commons on July 22 this Bill was read a third time by 233 votes to 85. Its rejection was moved on the ground that it conferred a 37 years' omnibus monopoly on the company, but Mr. Whiteley, chairman of committees, said the Corporation got a control over the motor omnibus service such as no other town possessed. If the conditions of the agreement were not fulfilled it could be terminated.

YORK CORPORATION.—Lord Haversham's Committee of the House of Lords on July 21 began consideration of the Bill promoted by York Corporation for, among other things, powers to provide and run trolley vehicles and motor omnibuses. The Bill had already passed the House of Commons. The North Eastern Railway Company renewed their opposition to two of the omnibus routes on the ground that it was proposed that the vehicles might stop, start, or turn round in front of the station in the company's road. The company also objected to the railless trolley cars turning opposite their station.—Mr. Macassey, for the Corporation, said the House of Commons Committee had suggested that the trolley vehicles should not stop opposite the station, but should proceed further down and turn there, but the Corporation could not consent to such a proposal. The whole purpose of the vehicles was to bring passengers as near as possible to the railway station.—Mr. Bengough, one of the engineers of the company, said the effect of the tramways was to drive a good deal of the traffic into a portion of the roadway belonging to the company. The turning of railless cars or omnibuses opposite the station would make matters worse, and the company might be forced to fence off their property. The committee decided that the preamble of the Bill was proved. They intended to preserve the clause inserted by the House of Commons, providing that if the Board of Trade thought it desirable, in consequence of increased traffic in the Station Road, they might, by order, require the Corporation to turn their vehicles at such other point as might be determined. The committee wished to extend the clause so as to include the motor omnibuses. The clauses having been adjusted, the Bill, as amended, was ordered for report.

L.C.C. TRAMWAY MATTERS.

At last Tuesday's meeting of the London County Council the following reports were presented and were adopted.

TRAILER CARS ON THE SOUTHERN TRAMWAYS.

The Highways Committee reported on May 5 as to the routes on the southern tramways on which the Board of Trade had agreed to trailer cars being run. The Board has now agreed to these cars being run also on the recently constructed tramways from Rushey Green to Beckenham Lane *vid* Bromley Road.

ASSISTANTS ENGAGED ON PROFESSIONAL AND TECHNICAL WORK.

The Council on March 31 decided that the fixed establishment of the tramways department should be increased so as to include several subordinate officers engaged in professional and technical work, and that there should be created four additional positions in the 1st class, six in the 2nd class, nine in the 3rd class, and two in the 4th class. The Committee now submitted the names of the temporary assistants who they suggested should be appointed to fill these positions. Those referred to in recommendation (*b*) are over 40 years of age, and the question of their admission to the superannuation and provident fund is under consideration. The figure in brackets after the name of each assistant indicates the number of years' service in the tramways department up to the present time. The Committee recommended:—

(*a*) That the undermentioned assistants, now temporarily employed, be appointed, subject to their passing satisfactorily the usual medical examination, on the permanent staff, as from and including April 1, 1914, at the yearly salaries mentioned:—

Officers to be placed in the second class—J. J. Harding (9), £237 10s.; F. H. Wigner (7), £237 10s.; G. G. Ringrose (9), £212 10s.; A. W. Leath (9), £212 10s.; R. S. Good (11), £212 10s.

Officers to be placed in the third class—N. H. Thomas (11), £200; C. W. Fourniss (5), £190; A. F. Bentall (8), £190; H. F. Stanford (12), £180; W. J. Thomas (7), £180; R. E. S. Macintryre (4), £180; T. McCrossan (9), £180.

Officers to be placed in the fourth class, section (a).—L. S. Price (9), £150; R. A. Nichols (7), £140.

(*b*) That the undermentioned assistants, now temporarily employed, be appointed, subject to their passing satisfactorily the usual medical examination, on the permanent staff, as from and including April 1st, 1914, at the yearly salaries mentioned:—

Officers to be placed in the first-class.—G. B. Dunn (8), £270; R. Baron (8), £270; J. S. Ashley (15), £270; F. W. Brock (8), £270.

Officer to be placed in the second class.—F. E. Gregory (6), £212 10s.

Officers to be placed in the third class.—G. Clark (7), £190; A. Wyatt (15), £170.

TOOLEY STREET TRAMWAYS—APPLICATION TO PARLIAMENT.

The London County Council (Tramways and Improvements) Act, 1912, authorised the Council to construct a tramway in Tooley Street from Bermondsey Street to Joiner Street. Section 14, however, provided that the Council should not work or use this tramway between 9.30 a.m. and 5.30 p.m. on any week day (not being a Saturday, Christmas day, Good Friday or Bank or public holi-

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day) nor between 9.30 a.m. and 12 noon on any Saturday. This tramway was opened on November 28, 1912, and had proved of great convenience. From observations taken at the busiest periods of the day it appears that the cars could be operated to the London Bridge terminus at all times without causing inconvenience to any persons using the warehouses and wharves in the vicinity. The Committee recommended that powers be sought in the session of Parliament of 1915 for the removal of the limitations imposed on the Council in respect of the use of the tramways in Tooley Street between Bermondsey Street and Joiner Street.

SUPPLY OF SPECIAL TRACKWORK.

The Council on October 17, 1911, entered into an agreement with Hadfield's Steel Foundry, Limited, for the supply of special trackwork for a period of five years in connection with the construction, reconstruction, renewal and maintenance of the Council's electric tramways at the following rates—at a reduction of 5 per cent. on the prices of the special work for construction and reconstruction work obtaining before July, 1908, and at a reduction of 2½ per cent. on the net prices of the special work for renewals previously supplied. Up to the present time the value of the special trackwork obtained from the company under the above-mentioned resolution for tramway construction and reconstruction works had amounted to approximately £34,372, and for renewals and maintenance purposes to approximately £48,468, a total of £82,840.

SUPPLY OF OVERHEAD LINE FITTINGS.

Fourteen items of fittings were required in connection with the maintenance of overhead line equipment. As the items were of special character the Highways Committee suggested that tenders should be invited from selected firms.

DRIVING AND PONY WHEEL STEEL TIRES.

The Highways Committee had considered the undermentioned tenders received, as the result of advertisement, for the supply and delivery in truck on the Council's railway siding at Charlton S.E. of either (i.) 3,000 driving wheel and 2,000 pony wheel tyres for the Council's tramcars or alternately (ii.) 6,000 driving wheel and 4,000 pony wheel tyres. Except in one case, that of J. Brown and Co., Limited, indicated below, the prices for each tire quoted by the several firms were the same whether the larger or the smaller quantity was supplied. Two of the firms did not quote for the larger quantity. The Committee had decided, as the result of the experience of the past few years, that one contract should be entered into for the supply of both types of tires :—

Name of tenderer.	(i.) Each driving wheel tire.	(i.) Each pony wheel tire.	(i.) 3,000 driving wheel tires and 2,000 pony wheel tires.	(ii.) 6,000 driving wheel tires and 4,000 pony wheel tires.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
*Andrew Brown and Co. ..	0 19 2	0 15 4	4,408 6 8	8,816 13 4
John Batt and Co. Ltd. ..	0 19 4	0 16 7	4,558 6 8	9,116 13 4
Phœnix Aktien-Gesellschaft für Bergbau	1 0 1	0 17 2	4,729 3 4	9,458 6 8
†Fried. Krupp A.G., ...	1 2 0	0 18 6	5,150 0 0	10,300 0 0
Bochumer Verein Bergbau ..	1 3 0	0 17 6	5,200 0 0	—
H. Bessemer and Co., Ltd. ..	1 3 0	0 18 6	5,300 0 0	10,600 0 0
J. Baker and Co. (Rotherham)	1 3 6	1 0 3	5,550 0 0	11,100 0 0
Workington Iron and Steel Co.	0 18 10§	1 8 5§	5,666 13 4	11,333 6 8
Brown Bayley's Steel Works	1 4 0	1 2 0	5,800 0 0	11,600 0 0
J. Brown and Co., Ltd. ..	1 3 0 1 2 6	1 4 0 1 3 6	5,850 0 0	11,450 0 0
Steel, Peech and Tozer, Ltd.	1 8 8	1 2 9	6,575 0 0	—
Midvale Steel Co. of Phila. ..	—	—	7,900 0 0	15,800 0 0
‡Vickers Ltd.	2 1 0	1 10 0	9,150 0 0	18,300 0 0

*Do not agree to wages clauses. †Do not agree to guarantee mileage.
‡Do not conform to specified analysis. §Delivered at the Central Car Repair depot.

The lowest tender for British manufactured tires was that of Henry Bessemer and Co., Limited, and amounted to £10,600, being an increase of £1,483 6s. 8d., or 16 per cent. over the prices tendered by John Batt and Co., Limited. The estimate of the chief officer of tramways comparable with the tenders was £11,000. The Committee had accepted the second lowest tender, that of John Batt and Co., Limited, and they recommended that authority be given to sublet to various foreign firms.

TRAMWAYS SCHEMES FOR NEXT SESSION.

The Highways Committee reported having had before them an exhaustive report by the officers dealing with the whole question of the tramways system from the point of view of linking up and general consolidation. They had viewed a large number of the routes affected, and as a result they hoped to submit in time for Parliamentary action next year a carefully prepared scheme to improve the terminal facilities of certain existing tramway routes which required most urgently to be dealt with. Monsieur A. Mariage, Directeur-General des Omnibus de Paris, had been consulted with regard to various phases of the problem. They had not yet had an opportunity of fully weighing his views upon the subject and their bearing upon the scheme which the Committee would wish finally to recommend the Council to adopt. Having regard to this fact, and to their desire if possible to come to an agreement in as many cases as possible with the local authorities concerned on the details of the proposals before presenting their report to the Council, the Committee proposed to postpone until after the summer recess the submission of their full report.

P.A.Y.E. Cars and Heavy Traffic.—Aberdeen holidays began on July 20, when the tramway traffic was exceptionally heavy. All the 75 cars were in service. The P.A.Y.E. cars worked capitally on the Beach route, which had the heaviest traffic with a one minute service.

GLASGOW TRAMWAYS IN 1913-14.

Approval was given to the accounts of Glasgow tramways department by the City Council on July 9 when Bailie Kirkland, convener of the committee, said that during the year upwards of 336 million passengers were carried. Four years ago, when the Council extended the halfpenny distances, they were carrying only 222 millions. The income amounted to £1,078,691, an increase of over £70,000 over the previous year. Every 63 passengers out of 100 took halfpenny tickets, so that the halfpenny fare was the backbone of the system. The surplus was over £53,000 as compared with £33,000 a year ago. The congestion of traffic in the centre of the city was giving the committee very serious consideration, and they had obtained power to erect a bridge at Oswald Street to link up Commerce Street. The committee were taking steps with a view to reducing the number of accidents, and he thought that the result for four weeks justified what had been done. They had decided to run a service of cars after midnight, to be inaugurated about the end of September or the beginning of October. They had got powers also to lay about 40 miles of new track, covering 20 miles of streets and roads. The committee, too, were watching carefully the development in motor omnibuses. On behalf of the committee he cordially thanked the general manager, his staff, and employees generally for the manner in which they had discharged their duties.

MISCELLANEOUS NEWS AND NOTES.

Demand for Cars at Cardiff.—The manager of the tramways has been asked to report to the committee as to what additional rolling stock is necessary.

Route Numbers on Side Windows.—An experiment is being tried on the Nottingham cars with route numbers on the side windows as well as over the canopies.

The Next Motor Car Show.—It is stated that practically all the space at the next Olympia Motor Show, which takes place from November 6 to 14, has been let.

Queue Experiment at Huddersfield.—In order to stop the scrambling for seats on the cars the Tramways Committee have decided to try the queue system in John William Street.

"Berna" Lorries.—The action between the British Berna Motor Lorries, Limited, and John Yarwood and Co., Limited, has been settled by mutual agreement, each party paying their own costs.

Tramway Fares for Teachers at Aberdeen.—It is proposed to give teachers of the board schools a bonus in lieu of tramway fares. There is apparently no definite rule in the matter, but the Council propose to arrive at some understanding as to what shall be held to qualify a teacher for receiving payment of car fares.

Roof Gardens on Passenger Shelters.—Mr. C. Furness, general manager of Blackpool Corporation tramways, has recommended the erection of a fountain on the South Shore of a type similar to some which he had recently seen at Continental resorts. Later it is proposed to erect other fountains on Princes Parade, and to transform the roofs of the promenade tramway shelters into roof gardens.

Protection for Glasgow Passengers.—The new by-laws framed by Glasgow Corporation for regulating the traffic in the streets will come before the Sheriff Court on July 27 for approval. The Scottish Horse and Motormen's Association intend to oppose the clause under which fast-running vehicles are debarred from passing on the near side of tramcars while passengers are boarding or alighting.

Advice to Conductors.—Sir John Courtis, chairman of Cardiff Tramways Committee, addressing a group of new drivers and conductors, informed the latter that civility cost nothing. The public expected to be looked after in getting on or off the cars, and conductors should do their best to prevent any accident. They should treat all the passengers properly, and make the service a credit to the city. Drivers should do everything possible to help the conductors.

Glossop to Manchester by Tramcar.—Stalybridge, Hyde, Mossley and Dukinfield Electricity Board have decided that in the event of application to Parliament for further powers, an effort should be made to secure authority to extend tramways from the Hyde and Stalybridge boundaries to Woolley Bridge, and also from Roaches to Greenfield. In the event of the length of extension to Woolley Bridge being carried out, it will complete the link of tramways between Glossop and Manchester.

Edison Omnibuses for South Shields.—An omnibus equipped with Edison batteries recently ordered by South Shields Corporation has arrived at South Shields. The machine is one of two which the Corporation have acquired on the advice of the general manager, Mr. W. T. Robson. They are intended to act as feeders to the tramway system over a route 1¼ miles in length. The body is of the single-deck type with a front entrance only, and the car provides seats for 22 passengers and a driver. The battery consists of 60 Edison A-8 type cells of 65 volts, 300 ampere hours capacity, weighs 1,800 lbs., and is placed under the seats.

Halifax Corporation Omnibus Department.—The accounts for the year ended March 31 last of the motor omnibus department of Halifax Corporation tramways show receipts totalling £2,551, or 8.953d. per mile run. On the Wainstalls section the receipts were £1,412, and on the Siddal section £1,116. The expenditure amounted to £2,723, leaving a deficiency of £172, transferred to net revenue account. The expenditure was made up of the following items :—Traffic expenditure £835 (2.932d. per mile run), general expenses £192 (.674d.), general repairs and maintenance

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£1,048 (3.679d.), petrol £561 (1.967d.), lighting £3 (.010d.), and interest on loans £84 (.296d.), the total expenditure per mile being 9.558d. There are three omnibuses. Included in the expenditure was the sum of £29 for the hire of an extra omnibus for one week. £186 of mortgage debt has been redeemed on the capital account of £2,510, and the sum of £2,324 has been contributed from the tramways surplus account.

Lancashire and Cheshire Municipal Tramways Managers' Association.—The quarterly meeting was held at Ramsbottom on July 10, when an inspection was made of the Ramsbottom railless trolley system recently installed there, and an interesting description thereof was read by Mr. Wyld, the general manager. The following members were in attendance :—Mr. Cowell (Blackburn) in the chair, Alderman Linsley, J.P. (president of the Municipal Tramways Association), Mr. Wilkinson (chairman of the Ramsbottom Tramways Committee), Messrs. Clough (Bury), Barnard (Bolton), Buckley (Wigan), Barnes Kay (Haslingden), Stewart (Rawtenstall), Eardley (Stockport), Pilling (Accrington), Wyld (Ramsbottom), Hocken (Darwen), Clarke (Birkenhead), and Holford (Salford), hon. sec.

Newcastle Employees' Agitation.—A vote by ballot of the union tramwaymen on July 21 resulted in 694 votes being recorded in favour of handing in their notices this week, while 75 votes were cast against that course. At a meeting of these men on July 18 it was alleged that the Tramways Committee had shown "deliberate dodging, procrastination and neglect" in dealing with the "all-grade programme, but Alderman Rodgers, the chairman of the Tramways Committee, in an interview, has stated that the matter has been delayed by the exigencies of the Parliamentary Bill. The Traffic Sub-Committee had dealt with nine out of the twelve items in the men's programme, and the remainder would be considered in time for a report to be presented to the committee on Thursday. In the absence of the chairman and vice-chairman of the Tramways Committee and the general manager in connection with the Tramway Bill in the House of Lords, the Lord Mayor (the Rt. Hon. Johnstone Wallace) on Thursday submitted the decision of the Tramways Committee to a deputation of the employees. The concessions given will cost £2,055 per annum, in addition to about £2,000 worth of concessions granted last November. His lordship stated that the committee were willing to meet the men again on any of the points in dispute. It is stated that the greatest difficulty lies in the refusal of time and a half for Sunday work.

Dearne Valley Light Railway Appeal.—The Light Railway Commissioners, at Bolton-on-Dearne on July 21, held a supplemental inquiry into the Dearne Valley Light Railway scheme, in accordance with a direction of the Board of Trade, in view of the appeal from the promoters, the Urban District Councils of Wath-on-Dearne, Bolton-on-Dearne, Wombwell, and Thurnscoe, against the deletion by the Commissioners of the proposed route from Wath to Bolton. Three steam railway companies maintained that the Commissioners had no jurisdiction in the matter; that the Board of Trade could only call upon the Commissioners to modify an order, there being no provision enlarging it. If necessary the companies would take steps in the Court of King's Bench to restrain the Board from proceeding further in the matter. Counsel for the promoters of the scheme said they were prepared with the local authorities of Wombwell and Rotherham to erect a tramway and highway bridge over the Great Central Railway at Elsecar, and they were now prepared to support their application for the deleted routes with evidence of great developments since the last inquiry. Mr. Stephen Sellon, engineer to the promoters, and others gave evidence, and Mr. H. England, of the West Riding Electric Tramways Company, expressed the opinion that the route from Wath to Bolton was essential to the scheme.

Engineering Matters at Burnley.—Reporting on the aggregate consumption of current per car mile having been 2.21 units, against 2.11 the previous year, Mr. H. Mozley, general manager of the tramways, states there is every certainty that this will be very much lower this year owing to the adoption of car watt meters. The amount should be about 2 units, which with the present consumption meant a difference of £1,800 per annum. The increase in repairs to the permanent way was caused by the work being more up-to-date and damage to paving by the new heavy motor lorry traffic. During the year 2,563 yards (single) of tramway had been relaid, all with Sandberg rails and the Corporation's own make of points and crossings. The manufacture of the points and crossings had so far proved satisfactory. A drawing is attached to the report showing the amount of wear since 1910 of the rails between the depôt and Nelson, the bottom of the groove having nearly been reached. The use of iron for axles in lieu of steel had so far given good results. There were now 72 iron axles in service. During the year 32 steel axles failed. 403 hammered rail joints had been filled in by oxy-acetylene welding at a cost of 11s. 4d. per joint. It was proposed to proceed with the conversion of four-motor equipment cars to two-motor equipments and the new truck. At a cost of £1,043 the removal of 61 centre poles had been effected in favour of wire suspension, the amenities of the road being much improved. When the rails were worn out they would be replaced with narrower "6-foot" way, thus giving more room for vehicular traffic rail to kerb.

CONTRACTS AND ORDERS.

E. Bennis and Company, Limited, have an order for two machine stokers and self-cleaning compressed air furnaces for an 8 ft. 6 in. diameter Lancashire boiler. This is a repeat order.

Walthamstow Town Council have accepted the tender of Messrs. E. Green and Company for an economiser.

The Peckham Truck and Engineering Company, Limited, have an order for one pendulum truck from Huddersfield.

Aberdare Urban District Council have accepted the tender of Heenan and Froude for a refuse destructor at £3,416.

The Equipment and Engineering Company, 2, Norfolk Street, W.C., are supplying a rail-grinder to Huddersfield tramways.

Bradford Council have accepted the tender of Ferranti, Limited, for two 250 k.v.a. transformers and four 150 k.v.a. transformers.

An Automatic Signal.—Oldham Tramways Committee have authorised the fixing of an automatic signal in Yorkshire Street, at a cost of £80.

The Admiralty Contract Department have accepted tenders for Tungsten filament lamps from Cryselco, Limited, Dick, Kerr and Company, Limited, and Pope's Electric Lamp Company.

Sydney Council (New South Wales) have awarded contracts as follows :—Babcock and Wilcox, two boilers, one Weir pump and steam and exhaust piping, £19,934; Standard Cable Manufacturing Company, bare copper cable; British Insulated and Helsby Cables, cable; Western Electric Company, feeders; Wm. Elder and Co., finials for steel poles, 4s. 4d. to 11s. 3d. each.

London County Council on Tuesday accepted the following tenders :—Messrs. G. Robson and Co., Sheffield, amounting to £288, for the supply of four portable electrically-driven drilling and grinding machines. This was the lowest of five tenders. T. Toward and Co., Limited, for the supply of 12 tar boilers required in connection with the bitumen grouting of the permanent way. For the supply of 150 sets of plough collector gear required in connection with the equipment of Class A and D cars with trolleys and collector gear, British Westinghouse Electric and Manufacturing Company, Limited, amounting to £1,181 5s., at £7 17s. 6d. per set. The estimate of the chief officer of tramways, comparable with the tenders, was £1,320. For the provision of a vertical drainage pump for draining water out of tramway cable manholes, Drysdale and Co., Limited, amounting to £178 12s. 6d. Eight tenders were received for Jarrah wood and creosoted deal paving blocks for the permanent way of the Council's tramways. The Highways Committee had accepted the lowest tenders. The total value of the tenders accepted is approximately £3,885, and the estimate of the chief officer of tramways comparable therewith is £4,000. The accepted tenders were :—

(i.) *Millar's Timber and Trading Company, Limited—Jarrah wood paving blocks.*

50,000 3in. by 9in. by 4½in. delivered by barge at Poplar Wharf at £12 8s. 6d. a thousand.
50,000 3in. by 9in. by 4 in. " " County Wharf at £12 7s. a thousand.
40,000 3in. by 9in. by 4in. " " at £10 16s. 10d. a 1,000.

(ii.) *John B. Lee and Sons, Limited—Creosoted deal paving blocks.*

40,000 3in. by 9in. by 5in. delivered by barge at County Wharf at £9 9s. 6d. a thousand.
120,000 3in. by 9in. by 4 in. " " " at £8 11s. a thousand.
50,000 3in. by 9in. by 4in. " " " at £7 12s. 6d. a thousand.
50,000 3in. by 9in. by 4½in. " " at Poplar Wharf at £8 12s. 6d. a thousand.

The Highways Committee had accepted the offer of G. Hayward and Co. to supply, at a cost of £7 each, 40 movable platforms for car-washing purposes in connection with the extension of the Abbey Wood car shed.

PERSONAL.

The Late Mr. A. B. Anderson, chairman of the B.E.A.M.A., who was lost in the wreck of the *Empress of Ireland,* left estate valued at £6,260 gross and £6,059 net.

Mr. E. F. Fleet, of Newcastle-on-Tyne, has been appointed signal engineer on the North Eastern Railway in succession to Mr. Arthur Hurst, who has occupied that position since 1899, but has now retired.

Mr. E. S. Smith, of the Electric Car Company at Preston, is leaving for Brazil to act as assistant engineer of Messrs. J. G. White and Company, Pernambuco. He has been presented with a gold watch and dressing case by the officials and employees of the Preston car works.

Mr. Edgar Barralet, of Messrs. Pinchin, Johnson and Company, who has recently undergone a serious operation, desires us to tender his thanks to the large number of friends who have been good enough to inquire as to his progress, and to assure them that he is now out of all danger and on the high road to recovery.

Sir Albert Henry Stanley, managing director of the London Underground Railways, London General Omnibus Company, the Associated Equipment Company, and the London United Tramways, was yesterday presented with a silver tea and coffee service and an album containing 20,000 signatures of the staff. The tea and coffee service bore the following inscription :—"Sir Albert Stanley. From nearly 20,000 employees of the T. O. T. Companies, in appreciation of the honour conferred by his Majesty the King—June 24, 1914." No officer or man was allowed to contribute more than the sum of one penny to the fund. About sixty representatives of the departments attended the presentation at Electric Railway House, the gifts being handed to Sir Albert by Mr. W. E. Mandelick, the secretary of the Associated Companies. They trusted that the holiday which he was about to take would thoroughly re-establish his health. Motorman Harris (District Railway), Conductor Barr (L.G.O.), and Mr. Miles (works department of the London United Tramways) each added a tribute from the departments they represented. Sir Albert Stanley, who was warmly cheered, most sincerely thanked the staff for the gifts, and said that the greatest satisfaction he had experienced in connection with the honour recently bestowed upon him was to find a universal expression of congratulation on the part of the men. He and they were working

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shoulder to shoulder in the problem of London traffic, and if as the men's representatives had stated that morning they were satisfied with the treatment they had received, then he was well satisfied. They were engaged in making the London traffic system an ideal one, and he desired that every man should feel proud to be associated with the company.

The late Sir J. Wilson Swan, F.R.S., whose death occurred in May, left £58,344 net personalty. He left his electrical and laboratory equipment, etc., to be presented to any person or institution or corporation that his executors might select to receive them. His bequests included one of £100 to the Royal Society (says the *Times*) for "defraying the cost of scientific publication."

FINANCIAL REPORTS AND MEETINGS.

Mumbles Railway and Pier Company.—Interim dividend at the rate of 7½ per cent. per annum (7s. 6d. per share), less income-tax, on the ordinary shares for the half-year to June 30.

Swansea and Mumbles Railway Company.—Interim dividend at the rate of 9⅜ per cent. per annum (7s. 6d. per share), less income-tax, on the ordinary shares for the half-year to June 30.

Melbourne Tramway and Omnibus Company, Limited.—The London secretary has received cable advice of the declaration of a bonus of 2s. per share from profits for the year ended June 30 last.

British Columbia Electric Railway Company.—A dividend at the rate of 5 per cent. per annum on the 5 per cent. preferred ordinary stock has been declared for the half-year ended June 30, and an additional dividend at the rate of 1 per cent. per annum for the same period.

Queensland Government's Profit-Sharing Scheme with Brisbane Tramways.—In his remarks at the annual meeting of the Brisbane Electric Tramways and Investment Company, Mr. H. R. Beeton, the chairman, observed that towards the close of last Session of Parliament the Queensland Government introduced a Bill very similar to that promoted earlier in the year by the local authorities (which was allowed to drop), with a view of constituting a Trust with power to purchase the tramways in agreement with the company at any time, or, as an alternative, to come to a profit-sharing agreement. The Bill was read a first time in November last, and would come up later. The directors had no objection in principle to either proposition, and if the Bill became law they would be prepared to discuss terms. The objection raised by the Australian Tramways Employees' Association to the company's application for an order prohibiting proceedings on the award made against the company in the Arbitration Court had been overruled, and the case would shortly be heard on its merits. Hearty votes of thanks were accorded by the meeting to Mr. Badger, the manager, and his staff.

Accounts of Halifax Tramways.—Halifax borough treasurer has issued the annual accounts of the tramways department, showing receipts totalling £109,650, or an average of 11.738d. per car mile, as compared with £105,973 in 1912-13. The receipts included the following items:—Revenue from passengers £105,674, private cars £155, G.P.O. carriage of mail bags £105, ticket vouchers and tokens £351, luggage £185, parcel traffic £2,147, advertising on cars £957, rents, Mile Cross, etc., £76. The expenditure amounted to £73,272, or an average of 7.844d. per car mile, as against £69,661 in the preceding year. Chief among the items of expenditure were the following:—Permanent way £5,702, overhead equipment £1,329, parcel traffic £1,270, power expenses £20,425, and repairs and maintenance of cars £7,959, inclusive of £2,595 for motors, armatures, etc., and £1,123 for trucks, wheels, and axles. £4,433 of the car repairs and maintenance was on account of material and £3,526 of wages. After meeting interest on loans, sinking fund and interest, etc., the net profit was £13,643, which was appropriated, £6,033 in relief of rates, £2,324 to balance of capital cost of motor omnibuses, and £5,792 to the renewals fund. The population served numbers 176,000, car miles 2,242,086, and passengers 20,276,077, the average journeys per head of population being 115. Units used per car mile were 1.94. Of 101 cars in stock 77 were in use daily. The average speed was 7.23 miles per hour, as against 6.8 in the two preceding years. The renewals fund stands at £34,122. £117,564 of mortgage debt has been redeemed, leaving £297,327.

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Complete Equipment
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WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 60 of the principal undertakings of the United Kingdom for the week ended July 18, give total receipts of £252,755, or £10,414 more than in the corresponding week last year. The total length of track was 2,863 miles, or 24 more than for the corresponding week. Receipts were at the rate of £88 5s. 7d. per track mile, an increase of £2 18s. 6d. as compared with the corresponding week of last year.

THE BRITISH ELECTRICAL FEDERATION.

The traffic statement for the week ended July 17, 1914, shows that the receipts from tramways and railways amounted to £43,553 as compared with £42,424 in the corresponding week last year, and from omnibuses £18,110, as compared with £10,406, making a total of £61,663, as compared with £52,830. The tramway and railway route mileage was 429.82, as compared with 428.47. Upon such of the services as were working both last year and this year the receipts show an increase of £2,766 upon the week.

RAILWAYS OF THE UNITED KINGDOM.

The summary of the official traffic returns of the fifty principal railways of the United Kingdom for the week ended July 19 gives a total of £2,617,759, which was earned on 22,162 miles, being at the rate of £118 2s. 4d. per mile of line open. For the corresponding week of 1913 the receipts of the same lines amounted to £2,640,082 with 22,137 miles open, or £119 5s. 2d. per mile. There was thus a decrease of £22,323 in receipts, an increase of 25 in mileage, and a decrease of £1 2s. 10d. in receipts per mile. Thirty-six of the returns distinguish between the receipts from passenger and goods traffic, and these show an increase of £15,934 (or 13s. 2d. per mile) in the passenger receipts and a decrease of £36,591 (or £1 14s. 11d. per mile) in the receipts from goods traffic. The aggregate receipts of the fifty railways since the beginning of the year amounted to £65,220,485, in comparison with £65,685,720 last year, a decrease of £465,235.

COPPER AND ALUMINIUM MARKET.

July 24, 1914.

Messrs. Henry R. Merton and Co., Ltd., 2, Metal Exchange Buildings, Leadenhall Avenue, E.C., supply the following quotations of prices per ton:—

	Friday, July 24.	Last week.	A Year Ago.
	£ s. d.	£ s. d.	£ s. d.
Standard Copper (cash)	59 12 6	61 1 3	66 7 6
,, (three months)	60 2 6	61 11 3	66 12 6
Electrolytic Copper—bars or ingots	62 10 0	63 10 0	69 0 0
Aluminium—bars or ingots	83 0 0	83 0 0	89 0 0

COAL MARKET.

July 24, 1914.

Messrs. Locket and Judkins, of 3, Fenchurch Avenue, E.C., report as follows:—

	Friday, July 24.	Last week.	A Year Ago.	Two Years Ago.
	s. d.	s. d.	s. d.	s. d.
London, free into barge in Thames—				
Best Admiralty Welsh (large)	27 6	26 6	25 6	
Best Seconds	24 0	24 0	24 0	
Ordinary Drys	21 0	21 0	21 0	
Best Washed Nuts	21 6	20 0	21 0	
Best Washed Peas	19 6	19 6	19 6	
Cardiff, f.o.b.—				
Best Admiralty (large)	23 0	22 0	21 0	17 3
Best Seconds	19 6	19 6	19 6	16 6
Ordinary Drys	16 6	16 6	16 6	14 9
Best Washed Nuts	16 0	16 6	16 6	13 9
Best Washed Peas	15 0	15 0	15 0	12 3
Newcastle, f.o.b.—				
Best Steams	15 3	15 3	15 3	13 6
Best Seconds	12 6	12 6	13 6	11 9
Smalls	9 0	9 0	10 0	10 0

No Quotations owing to transport workers' strike.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Anglo-Argentine	July 15	£55,646	£53,184	28	£1,564,694	+ £855
Auckland (28 days)	June 5	20,007	20,919	49	247,811	+ 6,331
Ballarat and Bendigo	May 24	3,550	3,515	8	8,082	+ 115
Brazilian St. Rly. Mlrs.	May	44,820	50,237	43	523,872	+ 76,626
Brazilian Traction	July 18	95,119	97,667	3	291,067	+ 6,921
Brisbane	June	25,013	28,590	26	168,975	+ 17,972
British Columbia $	May	701,991	678,314	47	8,128,904	+ 817,358
Buenos Aires Pt. & City	May	6,925	6,713	22	36,517	+ 3,206
Buenos Aires Lacroze	June	44,078	44,139	52	534,565	+ 5,988
Calcutta Rs.	July 18	66,618	69,918	28	19,44,064	+ 106,694
Cape Town	April	12,175	13,408	17	55,388	+ 3,926
Carthagena & Herreria	June	2,158	1,405	26	13,796	— 3,585
Cordoba	May	13,622	14,680	8	28,094	+ 1,448
East India	June	1,892	1,966	48	21,090	+ 809
Kalgoorlie	June	2,854	2,692	26	15,522	— 1,704
La Plata	June	4,846	4,561	26	29,244	— 2,328
Lima	May	32,256	33,150	22	173,754	+ 6,825
Lisbon Mlrs.	March	...	160,592	...	...	...
Madras (14 days) Rs.	July 15	28,492	32,189	27	377,858	+ 30,201
Manila	June	133,500	132,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	May	62,000	64,500	22	827,000	+ 8,000
Mexico $	June	588,780	592,463	26	3,530,545	+ 265,005
Montevideo	June	28,820	28,049	35	257,246	— 1,167
Para	June	25,373	20,914	30	150,423	— 30,495
Port Elizabeth	April	4,357	3,758	17	16,633	+ 245
Puebla $	June	61,300	62,600	26	380,800	+ 25,900
Rangoon	June	4,867	4,997	28	32,334	+ 982
Shanghai $	July 15	23,159	26,000	28	693,200	+ 18,570
Singapore $	July 18	12,454	11,467	28	345,385	+ 6,588
Toronto $	May	811,872	871,783	21	4,163,988	+ 323,708
Winnipeg $	May	326,827	337,664	21	1,756,589	+ 105,203

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TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	1914.	Incr. or Dec.	Aggregates. Wks	1913-4.	Increase or Dec.
Aberdeen Corporation..	July 15	£1,699	£1,775	+ £76	6	£11,763	+ £1,028
Accrington Corp.	,, 15	574	621	+ 47	15	9,290	+ 463
Ayr Corporation	,, 15	578	533	— 45	9	3,917	+ 258
Bath Electric	,, 15	1,227	1,449	+ 222	28	26,792	+ 2,147
Birkenhead Corp.	,, 19	1,296	1,300	+ 4	15½	20,414	— 283
Birmingham Corp.	,, 18	11,568	12,527	+ 959	16	200,183	+ 17,609
Blackburn Corporation	,, 15	1,638	1,389	— 249	16	22,280	+ 1,259
Blackpool Corporation	,, 15	2,529	2,833	+ 304	16	28,617	+ 3,998
Bolton Corporation	,, 19	2,831	2,859	+ 28	16	45,582	+ 1,871
Bournemouth Corp.	,, 22	2,292	2,374	+ 82	16	35,135	+ 2,313
Bradford Corporation..	,, 18	6,224	6,713	+ 489	16	101,405	+ 6,317
Brighton Corporation	,, 19	1,182	1,277	+ 95	15½	18,322	+ 1,571
Bristol	,, 17	9,145	10,394	+ 1,249	28½	108,628	+ 18,958
British Elec. Federatn	,, 17	52,880	61,663	*	...	...	...
Burnley Corporation	,, 18	1,651	1,662	+ 11	16	27,305	+ 893
Burton-on Trent Corp.	,, 19	279	309	+ 30	16	4,833	+ 313
Bury Corporation	,, 19	1,390	1,386	— 4	15½	22,467	+ 541
Cardiff Corporation	,, 11	2,872	3,042	+ 170	14	43,683	+ 2,666
Chatham and District..	,, 16	1,055	1,085	+ 30	28	25,666	+ 490
Chesterfield Corp.	,, 9	242	268	+ 26	14	4,073	+ 427
Colne Corporation	,, 18	302	301	— 1	...	...	...
Cork Electric	,, 16	595	589	— 6	28	14 045	+ 287
Croydon Corporation ..	,, 10	1,622	1,832	+ 204	14	26,612	+ 2,036
Darlington Corporation	,, 18	253	281	+ 28	16	4,239	+ 280
Derby Corporation	,, 18	1,008	1,095	+ 87	15½	16,620	+ 996
Dover Corporation	,, 18	280	320	+ 40	16	3,961	+ 183
Dublin & Lucan	,, 17	170	186	+ 16	2½	410	— 14
Dublin United	,, 17	6,223	6,792	+ 569	28	164,810	— 2,457
Dundee City	,, 15	1,295	1,505	+ 210	8½	12,007	+ 522
East Ham Corporation	,, 18	1,011	1,133	+ 122	15½	17,051	+ 1,088
Exeter Corporation	,, 17	372	397	+ 25	16	5,799	+ 409
Gearless Motor 'Buses.	,, 18	608	481	— 127	29	13,557	+ 7,537
Glasgow Corporation	,, 18	19,676	19,991	+ 315	7	149,476	+ 8,528
Glossop (U. Elec. Supply)	,, 18	128	135	+ 7	29	3,511	— 79
Halifax Corporation	,, 14	2,211	2,298	+ 87	15	34,492	+ 2,049
Hastings & District	,, 15	1,212	1,345	+ 133	28	25,768	+ 534
Huddersfield Corp.	,, 18	2,169	2,362	+ 193	16	38,101	+ 4,098
Hull Corporation	,, 18	3,082	3,214	+ 132	16	50,725	+ 2,184
Ilford U.D.C.	,, 18	456	607	+ 151	15	8,619	+ 1,352
Ilkeston Corporation ..	,, 22	138	136	+ 8	16	2,204	+ 27
Ipswich Corporation ..	,, 18	519	573	+ 54	16	7,784	+ 671
Isle of Thanet	,, 18	1,283	1,395	+ 112	42	20,932	+ 991
Kilmarnock Corp.	,, 18	179	171	— 8	9	1,611	— 56
Lanarkshire	,, 16	1,714	1,998	+ 284	28	54,005	+ 7,874
Lancashire United	,, 15	1,723	1,709	— 14	28	46 854	+ 4,887
Leeds City	,, 18	8,519	9,037	+ 518	16	136,647	+ 6,225
Leicester Corporation..	,, 18	2,893	3,098	+ 205	29	83,734	+ 4,530
Leith Corporation	,, 18	736	847	+ 61	9	7 272	+ 333
Leyton U.D.C.	,, 16	1,365	1,503	+ 138	14	21 884	+ 1,196
Liverpool Corporation..	,, 18	14 650	13,801	— 849	28½	375,594	+ 12,441
Llandudno & Colwyn B.	,, 17	557	528	— 29	33	8 487	+ 24
London County Council	,, 15	42,745	44,773	+ 2,028	15	674,001	+ 31,618
London Gnl. Omnibus..	,, 18	66,505	76,015	+ 9,510	29	1,886. 75	+ 55 994
London United	,, 17	7.201	7,056	— 145	29	177.588	+ 2,467
Lowestoft Corporation	,, 4	219	247	+ 28	39	7,414	+ 809
Maidstone Corporation	,, 16	215	242	+ 27	16	3 452	+ 214
Manchester Corp.	,, 18	19.750	18,465	— 1,285	16	285,961	+ 7.208
Met. Elec. Trys.	,, 17	9 668	10,046	+ 378	29	264.097	+ 6,669
Nat. Steam Car Co., Ld.	,, 21	3,298	4,933	+ 1,635	37	158.969	+ 64.010
Nelson Corporation	,, 18	208	199	— 9	15½	3,416	+ 101
N'castle-on-Tyne Corp.	,, 18	4,813	5,324	+ 518	16	85,306	+ 9,451
Newport (Mon) Corp.	,, 18	780	1 009	+ 229	16	12,615	+ 1,665
New St Helens & Dist..	,, 15	1,031	960	— 101	2	1,999	— 21
Northampton Corp	,, 17	646	622	— 24	15½	9,403	+ 299
Nottingham Corp.	,, 16	3,365	3,636	+ 271	13½	54,873	+ 3,035
Oldham Corporation	,, 19	2,357	2,353	— 4	17	39,340	+ 2,289
Portsmouth Corp.	,, 11	2,585	2,877	+ 293	15	36 643	...
Preston Corporation	,, 15	864	919	+ 55	16	14,468	+ 226
Provincial	,, 18	2,349	2,443	+ 94	41	77,766	+ 4,432
Reading Corporation	,, 16	753	790	+ 37	15	11 337	+ 820
Rhondda	,, 16	1,200	1,278	+ 78	28	34,843	+ 1,879
Rochdale Corporation	,, 18	1,686	1,664	— 22	16	26,270	+ 707
Rotherham Corp.	,, 23	989	1,054	+ 65	16	16,516	+ 927
Salford Corporation	,, 20	5,263	5,318	+ 55	16	84 750	+ 620
Sheffield Corporation	,, 19	7,591	8,029	+ 439	16½	132,145	+ 7,150
Southampton Corp.	,, 15	1,424	1,524	+ 100	15	21,180	+ 1,307
Southend-on-Sea Corp.	,, 15	1,151	1,463	+ 312	16	16,467	+ 2,964
South Met. Trys.	,, 17	883	1,196	+ 313	29	31,593	+ 8,175
South Shields Corp.	,, 18	806	883	+ 77	15½	12,719	+ 1,590
Sunderland Corp.	,, 19	1.588	1,655	+ 67	16	24,171	+ 1,461
Sunderland District	,, 15	568	639	+ 71	37	21.687	+ 1,913
Swindon Corporation	,, 15	132	154	+ 22	15	2 729	+ 269
Torquay	,, 16	780	846	+ 66	28	15 350	+ 659
Trys. (M.E.T.) 'Buses	,, 18	6.663	10,159	+ 3,496	29	258.947	+ 181,576
TynesideTrys & Tmrds	,, 15	569	604	+ 35	3	1,242	+ 45
Wallasey Corporation	,, 18	1,335	1,440	+ 105	15½	21,047	+ 1,538
Walsall Corporation	,, 18	622	629	+ 7	29	18.043	+ 425
Walthamstow U.D.C.	,, 18	752	887	+ 135	16	13,542	+ 1,721
Warrington Corp	,, 16	423	501	+ 78	15	6,825	— 158
West Ham Corporation	,, 18	2,854	2 980	+ 126	15	44.733	+ 2,146
Wigan Corporation	,, 16	1,518	1.519	+ 1	15	23.374	+ 537
Wolverhampton Corp	,, 22	1,149	1.064	— 85	17	18,193	+ 555
Yorkshire (W. Riding)	,, 19	1.411	1.494	+ 83	29	42 207	+ 1.207

* From such of the services as were working both last year and this year the receipts show an increase of £2,766 upon the week.

ELECTRIC RAILWAY TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	1914.	Incr. or Dec.	Aggregate. Wks.	1914.	Increase or Dec.
Central London	July 18	£4,528	£4,444	— £84	29	£144.439	— £2,617
City and South London	,, 18	2,718	2 350	— 368	29	77.798	— 4,901
Liverpool Overhead	,, 19	1,858	1,719	— 139	29	49.703	+ 557
London Electric	,, 18	12,990	12,670	— 320	29	408.090	+ 1,565
Mersey	,, 18	2,350	2.119	— 232	29	64.807	— 310
Metropolitan	,, 19	18 676	18,818	+ 142	29	531.888	+ 41,773
Metropolitan District	,, 18	12.706	12,829	+ 123	29	381 326	+ 364

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AMBERLEY HOUSE, NORFOLK ST., W.C.

TRAMWAY AND OMNIBUS SHARE LIST.

Paid.		On Week	Quotations, July 24.
...	Alabama Trac. Ltg. Power Co. 5% 1st Mt. Gd. Bds.	...	65½ — 68½
5	Anglo-Argentine Trams. Co., Lim., 5½% Cum. 1st Pref.	...	4¾ — 5
5	Do. 5½% Cum 2nd Pref.	...	4½ — 4¾
100	Do. 4% Deb. Stk. Red.	...	90 — 92
100	Do. 4½% Deb. Stk. Red.	+ 1	97 —100
100	Do. 5% Deb. Stk. Red.	...	95 — 97
100	Auckland Elec. Trams Co. Ld. 5% 1st Mt. Db. Stk. Red	...	101 —104
1	Bath Electric Tramways, Lim. Pref. Ord	...	⅞ — 1
1	Do. 5% Cum. Pref	...	31/32 — 1 xd
100	Do. 4½% 1st. Mort. Deb. Stock, Red.	...	70 — 75
100	Birmingham Dis. Pwr. & Trac. Co. Ld. 4½% 1st Db. Stk.	...	84 — 86
10	Blackpool and Fleetwood Tramroad Co.	...	13¾ — 14½
	Bombay Elec. Supply and Trams. Co., Ord.	...	13½ — 14½
10	Do. do. 6% Cum. Pref.	...	11 — 11¾
100	Do. do. 4½% Db. Stk. Rd.	...	95 — 97
$100	Brazilian Traction Light and Power Co. Lim.	— ½	71½ — 74½
5	Brisbane Elec. Trams. Investment Co., Ltd., Ord.	...	7¼ — 7½
5	Do. do. 5% Cum. Pref	...	4¾ — 5¼
100	Do. do. 4½% 1st Deb Stock, Red.	...	100 —108
10	Bristol Tramways and Carriage Co.	...	5¾ — 6
10	Do. do. 4% Cum. Pref.	...	7 — 7¼
100	Do. do. 4% Deb. Stock	...	100 —102
100	Do. do. 4½% Deb. Stock	...	95 — 97
100	British Columbia Elec. Rly. Co., Lim., Def. Ord. Stck.	...	106 —110
100	Do. Pref. Ord. Stock	+ 1	104 —108
100	Do. 5% Cum. Perpetual Pref. Stock.	...	103½ —105½ xd
100	Do. 4½% 1st Mort. Debs.	...	98 —101
40	Do. 4½% Vancouver Power Debs.	...	92 — 96 xd
100	Do. 4½% Perpetual Cons. Deb Stk.	— ½	95½ — 97½
100	British Elec. Traction Co., Lim., 6% Cum. Pref.	...	85 — 89
100	Do. 7% Non-Cum. Pref.	...	54 — 57
10	Do. 6% Pref. Ord. Non-Cum.	— ½	16½ — 18½
100	Do. Deferred Ord. Stock	...	10 — 12
100	Do. 5% Perpetual Debenture Stock	...	91 — 93
100	Do. 4½% Second Debenture Stock, Red	...	76 — 79
100	B. Aires Port & City Trms 6% 1st Deb. Stk. Red	...	70 — 75
100	Buenos Ayres Lacrose Trams. Co., Stg. 5% 1st Mrt. Deb.	...	99 —101
5	Calcutta Tramways Co., Limited Ord	...	7½ — 7⅝
5	Do do. 5% Cum. Pref.	+ 1/16	4⅞ — 5⅛
100	Do. do. 4½% 1st Deb. Stock, Red.	...	98 —101
1	Cape Electric Tramways, Ld.,	...	⅝ — ¾
10	Carthagena and Herrerias Steam Tramways Co., Lim.	...	2¾ — 3⅛
100	Do. 5% Debs. Red.	...	86 — 89
5	City of Buenos Ayres Trams. Co (1904), Lim.	...	5¾ — 5⅝
100	Do. 4% Debenture Stock Red. 1965	...	95 —100
100	Colombo Elec. Trys and Ltg Co. 5% 1st Mort. Deb	+ 2	93 — 97
100	Companhia Ferro Carril do Jardim Botanico, 5% 1st Mt.	+ 1	93 — 95
10	Cork Electric Tramways and Lighting Co. 5% Cum. Pref.	...	— 6½
10	Dublin United Trams. Co. (1896) Lim. Ord.	— 1/16	— 10⅛
10	Do. do. 6% Pref.	...	— 12⅞
100	Do. do. "A" Red.	...	— 80½
100	Do. do. Deb. Stock "B" Red.	...	— 79½
10	Gateshead & Dist Trys. Co., Ord.	...	8½ — 9
1	Hastings & Dist. Electric Trams Co. Ld., Ord.	...	⅞ — 1
1	Do. do. 6% Cum Pref.	...	31/32 — 1
100	Do. do 4½% Deb. Stk. Red.	...	65 — 70
$1,000	Havana Electric Railway, Con. Mort. 5% Bonds	...	91 — 95 xd
100	Hong Kong, Tramways Co., 5% Mort. Bds. (Regd.)	...	85 — 90
10	Imperial Tramways, Ord.	...	3¾ — 3½
10	Do do. 6% Cum. Pref.	...	6¼ — 6½
100	Do. do. 4½% Deb. Stock	...	74 — 75
5	Isle of Thanet Elec. Trams. & Ltg. Co., 5% Cum. Pref.	...	2 — 2¼
100	Do. 4% Debenture Stock	...	71 — 76
1	Kalgoorlie Elec. Trams., Ltd.	...	...
100	Do do. 5% "A" Deb Stk.	...	83 — 87
100	Do do. 6% "B" do.	...	10 — 20
7/6	La Plata Elec. Trys. Co., Lim., 6% Cum. Pref.	...	33/32 — 1 1/32
10	Lanarkshire Tramways Co.	...	9⅛ — 10⅜
100	Lancashire United Tramways. 5% Prior Lien Deb.	...	84½ — 86½
1	Lisbon Electric Trams., Lim., Ord.	...	1 3/32 — 1 5/32
1	Do. 6% Cum Pref.	...	1 — 1⅛
100	Do. 5% Mort. Debs.	...	92½ — 97½
1	London and Suburban Trac. Co., Lim., Ord.	...	3/32 — 5/32
100	London General Omnibus Company, Limited. 4½% Deb.	...	99 —101
100	Do. Do 5% Cum, Inc. Deb. Stk. Red.	...	87 — 90
100	London United Trms. (1901) Ltd., 4% 1st Mt. Deb. Stk. Red	— 1	53 — 57
100	Madras Electric Trams. (1904) Lim., 6% Cum. Pref	...	4½ — 5¾
5	Do. do. 5% Deb. Stk., Red.	...	99 —101
100	Manaos Trys. & Ltg. Co., 5% 1st Debs., Red.	...	75½ — 78½
$100	Manila Electric R.R. and Lighting Corp. Capital Stk.	...	100 —104
$1,000	Do. do. 5% Bds.	+ 1	100 —102
1	Mansfield and Dist Trys. Ltd. 6% Cum. Pref	...	1/16 — 1 1/16
100	Metropolitan Elec. Trms. Ltd. 4½% Deb Stock, Red.	...	84 — 87
100	Do. 5% Deb Stock, Red.	...	85½ — 88½
100	Mexico Tramways Co., Common Stock	— 3	70 — 74
500	Do. Gen. Con. 1st Mort. Gld. Bonds	...	83 — 87
100	Do. 6% 50-yr. Mort. Bonds	+ 1	77 — 81
...	Michigan United Railways 5% 1st Mort. Gld Bonds	...	90 — 92
100	Montreal Street Railway, Sterling 4½% Debs. (1922)	...	99 —101
100	Do. 4½% Sterling Debs, (1922)	...	98 —100
1	National Steam Car Co. Ltd	...	1/32 — 3/32
10	Oldham—Ashton and Hyde Elec. Ord.	...	6 — 6½
10	Do. do. 5% Cum. Pref.	...	5⅞ — 6⅛
5	Para Elec. Rlys. and Ltg. Co., Ord.	...	4 — 4¼
	Do. do 6% Cum. Pref.	...	4 — 4½
1	Perth (W.A.) Elec Trams. Ld., Ord.	...	— —
1	Potteries Electric Traction Co., Ltd., Ord.	...	1/16 — 1/8
1	Do. 5% Cum Pref	...	3/32 — 5/32
130	Do. 4½% Debenture Stock, Red.	...	81½ — 84½
1	Provincial Tramways. Lim. Ord.	...	1/16 — 1/8
10	Do. 5% 1st Deb. Stock	...	98 —101
...	Puebla Tramway, Light & Power Co., Prior Lien 5%	...	69 — 74
5	Rangoon Elec. Trams. & Supply Co. 6% Cum. Pref.	...	5 — 5¼
100	Do. do 4½% 1st Mt. Db. Stk.	...	94 — 96
100	Rhondda Tramways Co., 5% 1st. Mt. Debs.	...	87 — 89
$500	Rio de Janeiro Trys. Lgt & Pr. Co. 1st Mt. 30 yr, 5% Gd. Bds.	+ ⅛	97 — 99
100	Do. do. 5% 5-yr. Mort. Gold Bonds	+ ⅛	89½ — 91½
$500	Sao Paulo Tr. Light & Power, Co. 5% 1st Mort Debs 1929	...	97 —101
100	Do. do. 5% Perp. Cons. Debs.	...	98 —101
10	Shanghai Elec. Construction Co.	...	12½ — 13½
100	Singapore Elec. Tramways Lim., 5% Debs. Red	...	88 — 93
	South Met. Elec. Trams. and Ltg. Co., 6% Cum. Pref.	...	...
100	Do. do. 4% Deb. Stk.	...	64 — 68
...	Southern Elec. Trys. Co. of B.A., 5% 1st Mrt. Debs.	+ 2	99 —102
100	Toronto Railway Co., 1st Mt. 4½% Sterling Bonds	...	97 — 99
100	Toronto Suburban Rly. Co., 4½% 1st Mort. Deb. Stock	...	78 — 80
100	Tramways (M.E.T.) Omnibus Co., 4½% Gtd. Deb. Stk.	...	90 — 93
5	United Elec. Tramways of Monte Video, Ord.	...	4¼ — 4¾
5	Do. do. 6% Cum. Pref.	...	4⅝ — 5⅛
100	Do. do. 5% 1st Deb. Stk. Red.	...	95 — 97
100	Winnipeg Elec. Rly. Co. 4½% Perp. Cons. Deb.	...	93½ — 95½
5	Yorkshire (West Riding) Elec Trys. Co., Ord.	...	⅜ — ½
5	Do. do. 6% Cum Pref.	...	4½ — 4¾
100	Do. do. 4½% 1st Deb. Stock, Red.	...	84 — 87

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THE

Tramway & Railway World

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NOTICES.

All Communications and Advertisements for next week's issue should be received not later than 3 p.m. on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

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WEEKLY LIST OF TENDERS INVITED.

CITY AND COUNTY BOROUGH OF BELFAST.

TRAMWAYS AND ELECTRICITY DEPARTMENT.

The Tramways and Electricity Committee of the Belfast Corporation are prepared to receive tenders for the supply of an

Electric Motor Tower Waggon.

Specification, with form of contract, may be obtained from Mr. T. W. Bloxam, City Electrical Engineer, East Bridge Street, Belfast, on deposit of one guinea for each specification. This deposit will be refunded, provided a *bona-fide* tender has been sent in, and not withdrawn.

Extra copies may be obtained at 10s. each, which sum will not be returnable.

Sealed tenders, endorsed "Tender for Electric Motor Tower Waggon," to be lodged in my office, not later than 10 a.m. on Monday, August 24, 1914.

The lowest or any tender not necessarily accepted.

A tender if sent by post must be registered; if delivered by hand, an official receipt must be obtained for it, otherwise the undersigned will not be responsible.

R. MEYER,
Town Clerk.

COUNTY OF LONDON.

The London County Council invites tenders for the supply of 20,245 yards of Grooved Trolley Wire.

The form of tender, etc., may be obtained from the Chief Officer, London County Council Tramways, 62, Finsbury Pavement, E.C.

The person whose tender is accepted will be bound by the contract to pay wages at rates not less, and to observe hours of labour not greater, than the rates and hours set out in the Council's list. Particulars of the Council's Standing Orders as to its conditions of tender and contract are given in every issue of the *London County Council Gazette*. No tender received after 11 a.m. on Tuesday, August 4, 1914, will be considered. The Council does not bind itself to accept any tender.

LAURENCE GOMME,
Clerk of the London County Council.

County Hall, Spring Gardens, S.W.

BOROUGH OF SWINDON.

ELECTRICITY AND TRAMWAYS DEPARTMENT.

The Corporation are prepared to receive tenders for the exclusive privilege of Advertising on Twelve Tramcars (and any additional Tramcars) for a period of three, five, or seven years.

Copies of the general conditions and form of tender may be obtained on application to the Tramways Manager, Mr. T. Medcalf, Electricity Works, Swindon.

Sealed tenders, endorsed "Tender for Advertising," must reach the undersigned not later than 12 o'clock noon on Wednesday, August 19, 1914.

ROBT. HILTON,
Town Clerk.

Town Hall, Swindon,
July 24, 1914.

COUNTY BOROUGH OF NEWPORT.

ELECTRICITY AND TRAMWAYS DEPARTMENT.

The Newport Corporation invite tenders for the supply of Converting Plant, etc.

Specification, form of contract, together with schedules and drawings, and any further information required, may be obtained on application to A. Nichols Moore, M.I.E.E., Borough Electrical Engineer, Town Hall, Newport, Mon., upon production of the receipt of the Borough Treasurer for the sum of £2 2s., which sum will be returned to all *bona-fide* tenderers.

Sealed tenders, endorsed "Tender for Converting Plant," must be delivered either by hand or through the post not later than 10 a.m. on Monday, August 17, 1914.

The Corporation do not bind themselves to accept the lowest or any tender.

Contractors will be required to pay the recognised Union rate of wages and observe the recognised hours and rules of labour in the district.

ALBERT A. NEWMAN,
Town Clerk.

Town Hall, Newport, Mon.,
July 28, 1914.

COUNTY BOROUGH OF SUNDERLAND.

CORPORATION ELECTRICITY SUPPLY.

TO MAKERS OF ROTARIES AND MOTOR GENERATORS.

The Electricity Committee of the Corporation of Sunderland are prepared to receive tenders for the Construction and Installation of Two 1,500 kw. Machines.

Specification and form of tender can be obtained in duplicate upon application to the General Manager, Mr. Alfred S. Blackman, Electricity Offices, Dunning Street, Sunderland, upon payment of a deposit of one guinea, which will be returned after receipt of a *bona-fide* tender.

Tenders, addressed to the Chairman of the Electricity and Lighting Committee, Town Hall, Sunderland, must be delivered at my office not later than 12 noon on Wednesday, August 19 next, in sealed envelopes, endorsed "Tender for Electricity Works."

The Corporation do not bind themselves to accept the lowest or any tender.

H. CRAVEN,
Town Clerk.

Town Hall, Sunderland,
July 29, 1914.

VICTORIAN STATE RAILWAYS.

The Agent-General for Victoria, Australia, invites alternative tenders for the supply and delivery, f.o.b. port of shipment, and c.i.f. one of the railway piers at Williamstown, Melbourne, fully inclusive of Australian Customs, Duties, etc., of the following Rails and Fishplates:—

Contract 26,600.—Approximately 28,920 Tons of 80 lb. Steel Rails.

Contract 26,600.—Approximately 2,321 Tons of Fishplates for 80 lb. Rails.

Specifications, conditions of contract, and forms of tender may be obtained by *bona-fide* tenderers at the offices of the Consulting Engineers, John Coates and Co., Limited, 115, Victoria Street, Westminster, London, S.W.

Tenders must be delivered to the Agent-General for Victoria, Melbourne Place, Strand, London, W.C., endorsed on the outside "Tenders for Steel Rails and Fishplates—Contract 26,600," not later than 11 a.m. on Wednesday, September 2, 1914.

A preliminary deposit equal to ninepence for each and every ton of rails and fishplates tendered for must accompany each tender.

The Government of Victoria does not bind itself to accept the lowest or any tender.

PETER MCBRIDE,
Agent-General for Victoria.

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COUNTY BOROUGH OF OLDHAM.

ELECTRICITY WORKS.

The Oldham Corporation Electricity Committee invite tenders for the supply, delivery, and erection of :—

(1) Three Economisers.
(2) Three Induced Draught Fans and Motors.

Copies of the specification, prepared by Mr. Robert Blackmore, A.M.I.E.E., can be obtained from the Engineer, Electricity Works, Oldham, on payment of two guineas, to be returned by the Corporation on receipt of a *bona-fide* tender.

The Corporation do not bind themselves to accept the lowest or any tender.

Tenders must be sent to the Engineer at the above address on or before August 24, 1914.

J. H. HALLSWORTH,
Town Clerk.

Town Hall, Oldham,
July 22, 1914.

COUNTY BOROUGH OF WEST HARTLEPOOL.

TRAMWAYS DEPARTMENT.

MACHINE TOOLS FOR DEPOT WORKSHOPS.

Tenders are invited for the supply and erection of Machine Tools at the Tramways Depôt, Greenland.

Specification and form of tender can be had from the undersigned.

Tenders, in sealed envelopes, endorsed "Tramway Machine Tools," must be delivered to the Town Clerk, Church Street, West Hartlepool, not later than noon on Monday, August 17, 1914.

The Corporation do not bind themselves to accept the lowest or any tender.

CHAS. BURGESS,
General Manager.

Tramway Depôt, Greenland, West Hartlepool,
July 27, 1914.

WALTHAMSTOW URBAN DISTRICT COUNCIL.

TRAMWAY MATERIALS.

The Walthamstow Urban District Council hereby invite tenders for the supply and delivery of Tramway Rails, Castings, Fish-plates, Anchors, Tie-bars, Bolts, Bonds, etc.

Forms of tender and further particulars may be obtained on application to Mr. E. Morley, Surveyor to the Council, Town Hall, Walthamstow, on and after Wednesday, August 5, 1914.

Sealed tenders, addressed to the undersigned and endorsed "Tender for Rails, etc.," must be delivered by post only at the Town Hall, Walthamstow, not later than 5 o'clock p.m. on Wednesday, the 19th day of August, 1914.

The Council do not bind themselves to accept the lowest or any tender.

C. SYDNEY WATSON,
Clerk to the Council.

Town Hall, Walthamstow,
July 30, 1914.

POSITIONS VACANT.

CAVAN AND LEITRIM RAILWAY COMPANY, LTD.

PERMANENT WAY INSPECTING ENGINEER REQUIRED.

Full particulars as to duties will be given on application to the undersigned on or before the 8th August (prox.).

R. R. STEWART,
Secretary.

19 and 20, Fleet Street, Dublin,
July 29, 1914.

(Continued on page 95.)

TRAMWAY SUPPLIES, Ltd.,
Tramway Engineers,
Sole Selling Agents for S. Dixon & Sons' Tramway Material,
160, WOODHOUSE LANE, LEEDS.
Sole Manufacturers of
TURNER'S PATENT AUTOMATIC POINT CONTROLLERS.
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RIPON, England.

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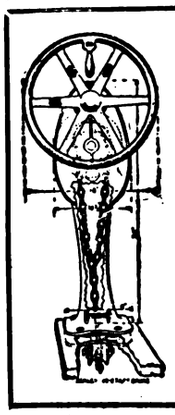
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THE
Tramway AND Railway World

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SATURDAY, AUGUST 1, 1914.

THE "OCEAN"
ACCIDENT AND GUARANTEE CORPORATION, LTD.,
IS THE
PREMIER INSURER OF TRAMWAYS
HEAD OFFICE:
MOORGATE STREET, LONDON, E.C.

NEWCASTLE TRAMWAY SUCCESSES.

There are circumstances connected with, and arising from, the recent agitation of the Newcastle Tramways employees that other tramway authorities would do well to consider. In the first place, it would be to the advantage of employers and employees if, when improvements in the conditions of employment are granted, a term of years be fixed during which no further application may be made. This system has been instituted at Bradford by Mr. C. J. Spencer, the manager, who some years ago also introduced an excellent arrangement under which the men have to demonstrate their efficiency before receiving an advance in grade. Three years is the period for which concessions remain operative at Bradford, and, in accordance with this agreement, the men's union recently submitted a new programme. In doing so they were free from the disturbing influence upon their work which is induced by sudden agitation, midnight meetings, ballots, and threats to strike. The Bradford method does not exhaust the expedients for securing calm consideration of the conditions of employment. For large tramway undertakings the Conciliation Board system may be deemed desirable, especially in view of the number of strikes that have taken place. A Conciliation Board, under the regulations of the Board of Trade, was adopted by the London County Council a few years ago, with the result that on two occasions the men have been granted valuable concessions, while this week advantages have been gained which will entail an expenditure of more than £21,000 a year. These practical fruits of conciliation should serve to nullify the effect which a rival union are making to secure the adherence of London tramway employees, one item in their programme being the abolition of the Conciliation Board. The attention of the County Council should be given to a statement made by the secretary of the West Norwood branch of this union, in a report of a recent meeting published in the union's organ, to the effect that a "show card day" is shortly to be held. This procedure to be effective must be held at the Council's depôt, and steps should be taken to prevent such interference with individual liberty. From the County Council's experience of the Conciliation Board a lesson may be derived for the guidance of other authorities, and it is very similar to a circumstance that contributed largely to the unrest among the Newcastle men. It is that there must not be any suspicion of undue delay in considering the men's requirements. The rules of the London Board do not permit of demands being considered during the somewhat lengthy summer recess. Owing to various causes a programme was put forward two years ago that threatened to encroach on the forbidden time, and it was only after a threat of a strike that a compromise was arrived at. It was not altogether the fault of the Newcastle Committee that the consideration of their employees' claims appeared to be somewhat protracted. Only last November the men were granted concessions costing £2,000, and at that time Alderman Rodgers, the chairman of the committee, inquired if there were any further demands to be considered. The reply was in the negative, but not long afterwards additional requests were advanced. Judged by the statement that the Alderman has made on the matter, the committee cannot be charged with the wilful obstruction alleged against them by the union officials. It would have averted much needless trouble if the latter had waited until the committee had been relieved of the work entailed by the successful promotion of their Tramway Bill in this session of Parliament, although the committee might have cut short the agitation by deciding at an earlier period what concessions they would grant. After having expended a vast amount of energy upon a ballot and a noisy midnight meeting, the employees met last Sunday morning and accepted the committee's revised offer, which will entail an annual outlay of £3,000. It is interesting to note that at the end of the proceedings the admission was made that the men's action at the first meeting was based upon a misconception of the terms. The moral of this is that tramway workers would be well advised to meet on Sunday morning instead of at midnight, when their tempers have been ruffled by a day's toil. On the whole, the Tramways Committee are to be congratulated on avoiding further difficulties with their men, who have now reason to be gratified with the treatment they have received. Taken in conjunction with the committee's notable success in the House of Lords Committee on Monday, when they obtained approval for their Bill, entirely putting to rout the representatives of the North Eastern Railway, which strenuously opposed, the week will be memorable in the tramway annals of Newcastle. Not only will the Corporation now be enabled to make tramway extensions of some five route miles, but it will be in a position to provide much-needed facilities by motor omnibus services in the district around Killingworth. These services will prove valuable feeders to the Corporation tramways, and in due time they will lead to further tramway extensions.

The Goods Traffic Proposal.—Rochdale Tramways Committee have resolved not to co-operate with Bury Tramways Committee in the project for carrying goods by car during the night.

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PRIVATE BILL LEGISLATION.

Bristol Corporation.—The Court of Referees of the House of Commons on July 22 granted a locus to all individual owners and ratepayers who were petitioning to appear in opposition to this Tramway Bill, but not to the Ratepayers' Association as such. West Gloucester Water Company were also refused a locus. Sir E. Cornwall's Committee of the House of Commons on July 28 were engaged on this Bill, which had been passed by the House of Lords with the addition of a clause, inserted at the request of the Tramways Company, placing the Corporation under the obligation to purchase the undertaking before being given powers to work the tramways. Petitions signed by 52 and 96 owners and ratepayers respectively were now presented against the Bill. Mr. Balfour Browne, K.C., appeared on behalf of the company to oppose any alteration of the Bill as passed by the Lords, and to state that the company did not agree with the estimate upon which the Corporation were proposing to purchase. Alderman Fearson, chairman of the Tramways Committee, cross-examined by Mr. Freeman, K.C., on behalf of opposing ratepayers, said that the company would retain their motor omnibuses when the tramways were purchased. He was of the opinion that the city would have power to refuse licenses for omnibuses not run for public convenience but in order to worry the Tramways Committee. On July 29 Sir John Snell and Mr. J. B. Hamilton, the experts who prepared the report upon which the Council came to a decision to purchase, repeated their evidence, and were subjected to long cross-examinations. Sir John replied that the omnibus business did not affect the value from an engineering point of view. Mr. Hamilton declined to be hurried in his replies, and insisted upon giving a full explanation of his views. He stated that judging by the increased expenditure of the carriage department of the company the omnibuses had not been a financial success. He did not agree that the cost of working motor omnibuses was less than working tramways. The petitioners' case was then heard. On July 30 the House of Commons Committee decided that the clause inserted by the Lords' Committee making purchase of the whole undertaking compulsory before the powers to work could be made operative should not remain in the Bill. Counsel for the Corporation thereupon stated that they preferred the Bill as it stood, and did not desire to see it lost by disagreement between the two Houses. Counsel for the company suggested that if the parties could meet they would be able to suggest an agreed clause. The Committee then adjourned. It is understood that a clause will be submitted which provides that if the Council exercises their option of purchase in May, 1915, they will acquire the outstanding parts not purchasable next year. The part purchasable in 1915 is to be acquired on tramway terms, and the remainder on terms to be settled by arbitration if not agreed.

Manchester Corporation.—The applications of the railway companies for contributions to the maintenance of roads and bridges to be used by the motor omnibuses of the Manchester tramways department were considered by a House of Commons Committee on July 28. The Committee decided that inside the city no contribution should be paid other than that provided by a clause under which the Corporation already undertake to contribute to the cost of the repair of bridges if by their excessive use of them the Corporation render such work necessary. In regard to roads outside the city, if the road authorities are paid any sum for the right to run motor 'buses, the railway companies, in regard to their roads and bridges, are to be treated in the same way.

Glasgow Corporation.—After several days' hearing Sir E. Cornwall's Committee of the House of Commons on July 24 passed the scheme for a new bridge, road, and tramway over the river Kelvin at Queen Margaret Drive, although it was still opposed by the Queen Margaret College authorities.

Newcastle Corporation.—Lord Haversham's Committee of the House of Lords on July 23 began consideration of this Bill, which sought powers to construct additional tramways and to run motor omnibus services in the urban districts of Longbenton and Weetslade.—The witnesses examined were Alderman Rogers, chairman of the Tramways Committee, Mr. W. J. Steel, city engineer, Mr. Edge, formerly city engineer, and Mr. Ernest Hatton, the general manager. The latter presented the estimates of profits on the tramway routes which would serve a population of 25,000. He added that colliery developments were taking place in the neighbourhood of Killingworth, where the witness resided, and greater facilities were needed between the villages and the city. He gave particulars of the deficiencies of the railway services, stated that the tramway fares would be lower than the railway fares, that the tramways would take the people nearer to their homes, and that they would develop building sites.—On July 24 Mr. J. B. Hamilton, general manager, Leeds tramways, gave evidence that the Newcastle tramways were admirably worked, and were very successful financially. He was of opinion that the proposed scheme was necessary, and would be a benefit to the districts served. He was satisfied that the proposed extensions would be self-supporting.—In cross-examination by Mr. Talbot, who opposed on behalf of the N.E. Railway Company, witness said he thought there was room both for the railway company's and the Corporation's facilities.—Re-examined, Mr. Hamilton said that in Leeds there were tramways running practically alongside the railways, and both the tramways and the railways managed to live.—Evidence was heard for and against the tramway scheme, and Sir A. Butterworth, general manager to the railway company, said he regarded the scheme as unsound, and it would affect the company, who had spent £500,000 on electrification. The company had had the guidance of experience as far as the demand for facilities between Heaton, Byker, and Benton was concerned. They had in progress new electrification which would cost £34,000. The company had general powers to run omnibuses, and they began a service in March of this year at the request of the residents of Longbenton. Over a considerable part of the electrified lines between Newcastle and Benton there was a 15-minutes service of trains daily at cheap fares. He did not think that the Corporation could develop a remunerative traffic to Gosforth Park out of race traffic in competition with the railway. It was outside the province of the Corporation to run omnibuses to the colliery villages. On July 27 the Committee found the preamble proved, and on the following day they refused to adopt a clause suggested by the company to the effect that in the event of a loss on the new tramways owners of any land used as a railway should be assessed for rate only in proportion as to one-fourth of the whole loss. The Bill was reported for third reading.

LONDON TRAMWAYS POWER STATION.

Proposed Outlay of £88,000.

The London County Council in December, 1912, approved the proposed substitution of four turbine engines for the four reciprocating engines for the production of power at the Greenwich generating station. The first turbine has been installed, and work in connection with the second turbine is in hand. At this week's meeting of the Council the Highways Committee reported that they had under consideration the question of making arrangements with regard to the substitution of turbines for the remaining two reciprocating engines. The load on the station is at present 32,500 kw., and power is being purchased to the extent of about 4,000 kw. Allowing for a diversity factor, the total requirements of the system may be taken at 36,000 kw., and during the coming winter the lighting load will increase this amount to between 38,000 and 39,000 kw. The load on the station will be substantially increased when the trailer cars are put into operation, and when additional through-running arrangements are completed. The development of services on the existing routes and the institution of services on new routes will also throw an additional load on the station. The cost of the two turbines with additional switchgear, condenser water piping, etc., is estimated at £88,000. Included in this estimate is an amount in respect of the installation of four induced draught fans for the Babcock and Wilcox boilers at the station. The Committee recommended that the chairman and vice-chairman of the Highways Committee be severally authorised during the summer recess to accept the most favourable tender, for the installation of four induced draught fans in connection with the Babcock and Wilcox boilers at the Greenwich generating station. The report was adopted.

L.C.C. TRAMWAY MATTERS.

The following reports were submitted and adopted at the meeting of the London County Council on Tuesday last.

CONSTRUCTION OF TRAMWAYS FROM LEE GREEN TO ELTHAM.

The estimated cost of the construction of the above tramways on both the conduit and overhead systems is as follows:—Track-work (including £7,000 for rails and fastenings and £1,100 for special trackwork), £51,875; sub-station equipment, £150; overhead equipment, £5,000; cables, £9,660; ducts, £2,940; feeder pillars, £120; cars, £4,750; total, £74,495. Subject to the passing of the clauses providing for the construction of these tramways in the Bill now before Parliament, the Highways Committee recommended the approval of an estimate of £57,025 in respect of the construction of the tramways, and that during the recess the chairman and vice-chairman be authorised to accept the most favourable tender.

£63,000 FOR RECONSTRUCTION OF TRACKWORK.

The Highways Committee recommended that an estimate of expenditure on capital account of £63,000, submitted by the Finance Committee in respect of the reconstruction of the trackwork of the horse tramways in Burdett Road, Grove Road, etc., from West India Docks to Penshurst Road, be approved, and that the chairman and the vice-chairman of the Committee be authorised, during the summer recess, to open any tenders that may be received, and to accept the most favourable tender.

RE-ARRANGEMENT OF SUB-STATIONS AND SUB-STATION PLANT.

In consequence of the constantly increasing number of car services, some of the tramways sub-stations are being called upon at certain times to supply the maximum amount of energy which could be transformed thereat, and a comprehensive scheme has been prepared for dealing with the difficulty, by means of the re-arrangement of the existing plant and the installation of additional machinery. The Highways Committee estimated that the total cost of the scheme would be £43,600. This amount includes £3,300 in respect of the building work required, £20,550 in respect of the cost of the alterations and additions to the existing machinery, and £19,750 in respect of cables and duct laying. Provision for this latter work was made in estimates at present before the Council, so that it would be necessary for the Council to approve an estimate on capital account of £23,850. The Committee recommended that the chairman and vice-chairman be authorised, during the summer recess, to open any tenders that may be received for building works from selected firms, and to accept the most favourable tender, for building works in connection with the re-arrangement of tramways sub-stations and sub-station plant.

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SUPPLY OF CABLES—CAPITAL ESTIMATE, £18,500.

In connection with tramway works to be carried out during 1914-15 various cables will be required for the undermentioned purposes—(i.) the construction of tramways in High Street and East Hill, Wandsworth, and from London Road to Park Road, Forest Hill, (ii.) the re-arrangement of sub-stations and sub-station plant, and (iii.) current repairs and renewals. The total expenditure is estimated at £22,170. The Highways Committee suggested that the Council should approve a capital estimate of, say, £18,500, and that tenders for the work should be invited by public advertisement, and that the chairman and vice-chairman be authorised to accept the most favourable tender.

WATERPROOF CLOTHING FOR MOTORMEN.

From information received on the subject from various tramway authorities it appears that in nearly every case motormen are provided with waterproof clothing, and in view of the fact that the motormen are exposed at times to severe weather, the Highways Committee were of opinion that an oilskin coat and cap cover should be issued to these men every two years. These cost respectively 8s. and 1s. 3d. each. The initial cost of providing the clothing suggested is estimated at £1,500.

IMPROVED CONDITIONS FOR EMPLOYEES.

The Highways Committee advised the Council to approve of an agreement arrived at by the Traffic Conciliation Board with regard to the conditions of labour of motormen, conductors, controller repairers, foremen washers, assistant night inspectors, and women checkers in the offices. The agreement is to come into force as from and including July 30, 1914, and the cost of giving effect thereto as regards motormen and conductors will, on the present establishment, amount to about £15,000 in respect of the remainder of the current financial year and £21,000 in 1915-16 and each subsequent year.

SUB-STATION PLANT TENDERS.

The Highways Committee had considered the following tenders for the supply of the rotary converters, static transformers, and overhead crane required in connection with the re-arrangement of tramways sub-stations and sub-station plant:—

(i.) ROTARY CONVERTERS.

Dick, Kerr and Co., Ltd.	£13,065	10	0
Bruce, Peebles and Co., Ltd.	13,092	0	0
The British Westinghouse Electric and Mfg. Co., Ltd. ...	14,196	5	0
The General Electric Co., Ltd.	14,261	0	0
The British Thomson-Houston Co., Ltd.	14,357	0	0
Siemens Brothers Dynamo Works, Ltd.	16,274	0	0

(ii.) STATIC TRANSFORMERS.

The British Electric Transformer Co., Ltd.	£5,695	0	0
The British Thomson-Houston Co., Ltd.	5,916	0	0
The British Westinghouse Electric and Mfg. Co., Ltd. ...	6,166	0	0
Do. do. (Alternative tender)	6,011	0	0
Johnson and Phillips, Ltd.	6,419	12	0
Bruce, Peebles and Co., Ltd, ...	7,065	0	0
Siemens Brothers Dynamo Works, Ltd.	8,420	0	0

The estimates of the chief officer of tramways comparable with the tenders are £12,450 for rotary converters and £6,700 for static transformers. The Committee proposed that the lowest tender submitted in each case, that of Dick, Kerr and Co., Limited, amounting to £13,065 10s., and that of the British Electric Transformer Company, Limited, amounting to £5,695 respectively, should be accepted. Both firms propose to sublet certain portions of the work.

For the supply, etc., of a 20-ton overhead travelling hand crane the Committee recommended the acceptance of the tender of Carrick and Ritchie, Limited, Edinburgh, at £265. Other tenderers were John Smith (Keighley), Limited, Keighley, £295, and Alexander Jack and Co., Motherwell, £310.

TRAILER CARS ON THE NORTHERN TRAMWAYS.

Under the London United Tramways Bill power is sought to run trailer cars on the north as well as the south side of the Thames. When the Council sought similar authority in 1912, Parliament limited the use of the cars to the tramways south of the Thames and on the Embankment, Vauxhall Bridge Road, and Beaufort Street, Chelsea. The Highways Committee now recommended that next session application be made to enable the Council to run trailer and coupled cars on the tramways north of the Thames.

ADDITIONAL SHELTER ON THE EMBANKMENT.

The Council having already approved of a capital estimate of £1,120 in respect of the provision of an additional shelter on the Victoria Embankment, the Highways Committee recommended that tenders be invited from selected firms, and that they be authorised to deal with the tenders during the recess.

FOUR-JOURNEY TICKETS—REDUCED FARES FOR CHILDREN.

While reporting against the adoption of transfer fares for short connecting journeys, the Highways Committee stated that they had arranged that a 6d. ticket, available on the day of issue only for any four journeys, should be issued on the tramways. This would enable a passenger to make a direct forward journey from almost any one point to any other point on the tramways. The new ticket would no doubt also be popular with visitors, and at terminal points would probably lead to passengers travelling by the first available car, thus securing many passengers who might otherwise be lost to the tramways.

After having on several occasions considered the desirability of issuing season tickets the Committee reported that they were of opinion that such tickets should not be introduced. Of 84 provincial tramway authorities communicated with all, with the exception of four, regarded the issue of season tickets as impracticable.

The Committee have instituted special tickets for children travelling to medical treatment centres of ½d. for a single journey between 9.30 a.m. and 4 p.m., not available on Saturdays, Sundays, and public holidays. It is estimated that approximately 400,000 of these tickets would be required annually. Of 21 of the principal tramway undertakings in the United Kingdom 14 have adopted cheap fares for children of from 12 to 16 years, while in two cases cheap fares have been adopted for children attending school up to 15 years. The Committee have decided to make the following concessions to children under 14 years:—½d. for 1d. single journeys on ordinary cars, and 1d. for 1½d. and 2d. single journey stages, and 1½d. for 2½d. and 3d. single journey stages. In the first instance these fares will be available only on Saturdays, Sundays, and Bank holidays.

THE FOREIGN TENDER FOR DRIVING AND PONY WHEEL TIRES.

On the adjourned report with reference to tenders for driving and pony wheel steel tires (published in our issue dated July 25), Mr. J. C. Mathew, K.C., moved the following:—"That the Council declines to sanction the sealing of the contract until the Highways Committee shall have ascertained from the Secretary of the Deutscher Metalarbeiter Verband whether the German firms, to which it is proposed to sublet the work under the contract, pay such rates of wages as are recognised by the trade union or unions in the districts in which the work is to be done." Mr. Hume said he accepted the amendment in principle, and would in future contracts make the necessary inquiries, but as the goods were urgently wanted he would halve the contract to provide only for 3,000 driving wheels and 2,000 pony wheels to go on with. Mr. Mathew withdrew the amendment on this undertaking, and the Committee's report was adopted.

MISCELLANEOUS NEWS AND NOTES.

Edinburgh and Electric Vehicles.—The electrical engineer of Edinburgh Corporation has been directed to report on the advisability of providing one or two electrically-driven vehicles for the use of the electricity department.

South Lancashire Tramways Company.—Worsley Council are endeavouring to induce the Board of Trade to hold an inquiry into the condition of this company's cars running through the district and the allegations of overcrowding.

Important Electrical Scheme at Manchester.—A House of Commons Committee on July 28 sanctioned the portion of the Manchester Corporation Bill which provides for the erection of an electricity generating station at Davyhulme at a cost of £1,200,000.

New Patterns in Fans.—An illustrated circular has been issued by the Edison and Swan United Electric Light Company showing the latest patterns of convertible table, breakfast, ceiling, ring, and portable fans. Copies may be had from the works at Ponder's End, Middlesex, or at the numerous showrooms.

Tramway Company Fined.—The Board of Trade on July 23 summoned the Hastings Tramways Company for continuing to use the Dolter stud tramway line after the Board had issued a prohibition order. A fine of £5 was imposed, although the company's advocate said there had only been a technical breach of the law.

Indian Suburban Railway Electrification.—The Eastern Bengal State Railway Company have issued the report prepared by Messrs. Merz and McLellan on the question of electrifying the suburban lines of this railway at Calcutta. The consulting engineers recommend the conversion to electric working of six lines of railway, and that the multiple unit control system of train working should be adopted.

Six Months' Fatalities.—Replying to a question in the House of Commons on July 29, the Home Secretary said that during the first six months of this year 242 persons were killed by vehicles in the Metropolitan Police area—viz., 55 by horse vehicles, 55 by motor omnibuses, 15 by tramcars, 19 by motor cabs, 45 by private motor cars, 35 by commercial motor vehicles, 14 by motor cycles, and four by other cycles.

Board of Trade and Holiday Luggage.—The Board of Trade have forwarded to Bolton Tramways Committee a letter received from a resident referring to the carrying of luggage to and from the station on the drivers' platform of cars during the local holidays. The Board stated it was desirable that nothing should be allowed to be placed on the drivers' platform in such a way as to cause him trouble in driving his car.

The British Thomson-Houston Company, for the convenience of their customers and themselves, have had two additional lines installed in their private telephone exchange at Mazda House, 77, Upper Thames Street, London, E.C. The telephone number has also been changed, and instead of ringing up Bank 5561/2/3 as heretofore, future calls must be made to one or other of the following numbers:—Central 10434, 10435, 10436, 10437, 10438.

Where Time and a-Half is Paid.—At the request of the men's union, Bradford Tramways Committee are giving triennial consideration to a new programme relating to wages and conditions of service. In respect to the demand for time and a-half for all time worked on Sundays and Bank Holidays, it is stated that among the municipal and private tramway undertakings that have conceded it are Warrington, Stoke-on-Trent, Northampton, Edinburgh, Birkenhead, Belfast, Burton-on-Trent, Aberdeen, Wigan, Birmingham, Sheffield, Salford, Nottingham, Huddersfield, Derby, Cardiff, and Burnley.

Suggested Municipal Working of Edinburgh Tramways.—It was decided by Edinburgh Council on July 28 to obtain powers to construct a tramway to Craiglockhart terminus along Colinton Road to Colinton. Notice was given of a motion directing the Tramway Committee to consider the taking over and working by the Corporation of the existing tramways, additional routes and extensions, the method of traction, the desirability of through working with Leith, and the extended use of motor omnibuses.

P.A.Y.E. Cars at Aberdeen.—In his annual report for the year ended May 31, Mr. R. S. Pilcher, the general manager of Aberdeen Corporation tramways, states that on February 2, 1914, the Council

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adopted the recommendation of the Tramways Committee to extend the pay-as-you-enter principle, and sanctioned the alterations to sixteen cars and the building of six new cars to the new design. The Beach route has been operated on this principle this year, in addition to the Woodside route. The total number of pre-payment cars which will shortly be in operation is 34.

Trolley Wire Splicing Sleeves.—The General Electric Company, Limited, has added to its catalogue of traction supplies, prices and description of the Acme splicing sleeves for splicing trolley wires. With Acme sleeves the most efficient joint can be made in the minimum time and with the least possible trouble. The process is perfectly simple; the two ends of the wires to be joined are drawn through the two halves of the sleeve, which is made in best gun metal and heavily tinned, and the projecting ends of the wire are flattened for a short distance, then by means of a central screw, the two halves of the sleeve are brought together. Holes are provided for filling in with solder if thought desirable.

Motor and Trolley Omnibuses and Road Maintenance.—In the House of Lords on July 28 the Earl of Donoughmore (chairman of Committees) moved "That it is desirable that a Joint Committee of both Houses be appointed to inquire and report as to the present law relating to the running of motor omnibuses and trolley vehicles under statutory powers and otherwise; whether any amendment is necessary with respect to the control to be exercised by local authorities; and what contribution, if any, should be payable towards the cost of road maintenance by the proprietors of such vehicles." Lord Monk Bretton (U.) suggested that the terms of reference should be enlarged so that the inquiry should include the question of establishing a Board of Control for London. He thought, also, it would be impossible to report on the question of cost without including tramways in the scope of the inquiry. The motion was agreed to.

CONTRACTS AND ORDERS.

Messrs. Chamberlain and Hookham have a contract for meters from Salford Council.

Coventry Tramways Committee have advised the Council to accept the Daimler Company's tender for two motor omnibuses at £1,626.

Keighley Corporation have placed contracts for the supply of a 750 kw. rotary converter and transformer at £1,595, and for two water-tube boilers at £5,076.

Witter and Sons, Limited, have obtained a contract for the supply and erection of an installation of automatic sprinklers and fire alarms in the Carlton Street repair shed of Bolton tramways.

Southampton Council have placed contracts as subjoined:—British Insulated and Helsby Cables, Limited, one mile of trolley wire at 8 1/16d. per lb.; Walton and Clough, Limited, erection of coal conveyors at the electricity works.

York Council have accepted the following tenders:—General Electric Company, a rotary converter and transformers at £2,793 11s. 6d.; British Thomson-Houston Company, switchgear at £175; H. E. Turner and Son, erection of a sub-station, £571 3s.

Fire Brigade Motor Appliances.—The Fire Brigade Committee of the London County Council have recommended acceptance of the tender of Mossay and Company, Limited, for the supply of one electrically-driven chassis for a turntable ladder, at £807.

Clough, Smith and Company, Limited, have recently secured the following overhead contracts: Northampton Corporation Tramways, Far Cotton extension; Merthyr Tramways, Cefn extensions; overhead construction of Hove experimental route for the Cedes Electric Traction, Limited.

The Brush Electrical Engineering Company have been awarded the following contracts:—Salford Council, 24 double-deck bogie cars with vestibule ends, 12 of these cars to have top covers; Wallasey Council, six double-deck cars with top covers, complete with trucks and electrical equipment.

J. W. Courtenay, Limited, have recently secured a further lease of the advertising rights on the Belfast Corporation cars. The firm has controlled the tramway advertising in Belfast for over twenty years, their first agreement having been made with the Belfast Street Tramways Company in 1893.

Bradford Tramways Committee have accepted the tender of the British Insulated and Helsby Cables, Limited, for 25 miles of grooved copper trolley wire, and of F. C. Booth and Company for 800 conductors' ticket boxes at 3s. 0d. each. The Electricity Committee have placed contracts as follow:—Cox-Walkers, Limited, one voltage regulator; S. Parsons and Co., steel building for housing induced draught plant; Sturtevant Engineering Company, Limited, one wet air filter for 5,000 kw. turbo-alternator; Ferguson, Pailin and Co., three switchgear cubicles for transformer chambers.

London County Council on Tuesday gave approval to the following contracts as recommended by the Highways Committee: Hadfield's, Limited, special trackwork at a cost not exceeding £1,100 for Lee Green to Eltham tramways, and special trackwork at a cost not exceeding £300 for a proposed lay-by in Park Road, Forest Hill, subject to the consent of the Board of Trade; Dick, Kerr and Co., Ltd., doubling the existing line of tramways in Graham Road at Mare Street, and the execution of a street widening there. An additional payment of £335 was sanctioned in respect of the use of manganese steel crossings, rails and guards in the installation of the Tooting Broadway junction line.

Requirements of the London County Council.—A recommendation was made by the Highways Committee of the London County Council at Tuesday's meeting of the Council that tenders for 13 pneumatic hoists required for use at the central car repair depot be invited from selected firms. Tenders are to be invited by public advertisement for the laying of cable ducts and fixing of feeder pillars, etc., in connection with proposed new and reconstructed tramways, and the rearrangement of tramways sub-stations, and the chairman and vice-chairman of the Highways Committee have been authorised to accept a tender during the recess. Selected firms are to be invited to tender for the execution of the additions and alterations necessary to give increased capacity to the coal bunkers and ash hoppers, and for the provision of additional workshops and stores and accommodation for staff in connection with the increase of plant at Greenwich generating station. Tenders are to be invited by advertisement for the reconstruction of various motor generators, and from selected firms for the supply of certain materials for reconstruction of tramways in Seven Sisters Road.

PERSONAL.

Mr. Alfred O. Jensen, of 46-48, Rue de Naples, Brussels, will hereafter represent the Ackley interests.

Mr. G. C. Milnes, borough electrical engineer at Lancaster, has been granted an increase of salary from £250 to £275.

Mr. G. Murray, of the British Thomson-Houston Company, has been appointed electrical engineer to the Government of Afghanistan.

Salaries Increased at Aberdeen.—The Tramways Committee have recommended the granting of the following increases of salaries:—Rolling stock superintendent, from £156 to £175 per annum; traffic superintendent, from £143 to £156 per annum, rising to £175 twelve months hence.

Mr. S. F. H. Parsons, chief draughtsman in the commercial office of C. A. Vandervell and Company, Acton Vale, has been presented with a case of cutlery from the management and staff on the occasion of his marriage. The gift was presented to Mr. Parsons by Mr. A. G. Goodwin, the general manager.

Mr. R. C. Bullough, tramways manager to Colchester Corporation, was entertained to dinner on July 28 by members of the staff who have been on the tramways since their inauguration ten years ago, July 28 being the 10th anniversary of the tramways. The invitation was conveyed to the manager by a beautifully illuminated address, couched in the following words:—

> We the undersigned members of the Colchester Corporation Tramways Department desire to record our appreciation of the impartiality with which you have supervised the department since its inauguration in 1904. We respectfully ask that you will honour us with your company, at a dinner to be held at the Red Lion Hotel, on Tuesday, the 28th of July, at 8 p.m.

In reply to congratulatory speeches, the general manager gave a resumé of the working of the tramways and testified to the good feeling which he believed to exist not only among the members present, but in the whole of his staff.

London County Council Appointment.—At the London County Council's meeting on July 28 the Highways Committee reported that on August 1, 1913, Mr. J. R. Wignall was transferred to the tramways department at a rate of pay of £6 6s. a week. Mr. Wignall entered the Council's service in the chief engineer's department in November, 1908, and until July 31, 1913, was engaged in a temporary capacity on work in connection with the construction and reconstruction of the tramways for electric traction. In the tramways department, Mr. Wignall inspected and reported upon the condition of the tracks in connection with the breakdown of vehicles on the tramways, and gave technical evidence in courts of law. The Committee were of opinion that he should be placed on the permanent staff at a salary of £330 a year, rising by annual increments of £10 to £350. The recommendation was agreed to.

FINANCIAL REPORTS AND MEETINGS.

The Financial Crisis.—In view of the enormous sales of securities on the Stock Exchange on foreign account during the past few days, the Committee of the Stock Exchange closed the house yesterday (Friday) until further notice. This unprecedented action has been generally approved in the City. The Bank rate, which was raised on Thursday from 3 to 4 per cent., was put up yesterday afternoon, in view of the critical political and financial outlook, to 8 per cent. Not since November 20, 1873, has the rate stood at this level. With few exceptions British tramway securities have suffered only a small decline, there being, however, practically no dealings.

Blackpool and Fleetwood Tramroad Co. have declared an interim dividend at the rate of 4 per cent. per annum.

London Electric Railway Company.—The interim dividend for the half year ended June 30 is at the rate of 1 per cent. per annum on ordinary shares.

Bristol Tramways and Carriage Company.—An interim dividend has been declared at the rate of 4 per cent. per annum for the half year ended June 30.

Kalgoorlie Electric Tramways Company.—The accounts for 1913 show, after providing for interest and sinking fund on the A debenture stock, a deficiency of £6,520.

Metropolitan District Railway Company.—For the past half year an interim dividend at the rate of 3 per cent. per annum on the second preference stock is announced.

Western Wagon and Property Company.—The directors have declared an interim dividend at the usual rate of 10 per cent. per annum for the half year ended June 30.

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Paisley District Tramways Co. have declared an interim dividend at the rate of 5 per cent. per annum on the 5 per cent. cumulative preference shares for the half-year to June 30.

Liverpool Overhead Railway.—Interim dividends have been declared at the rate of 5 per cent. per annum on the preference shares and 2½ per cent. per annum on ordinary shares for the half year.

The City of Buenos Ayres Tramways Co. (1904) have declared a dividend of 1s. 3d. per share (being at the rate of 5 per cent. per annum), less income-tax, for the three months to June 30.

Chatham and District Light Railways Co.—For the past half-year the revenue was £23,548 and the expenditure £13,756. The available balance is £7,298, and a dividend at the rate of 3 per cent. is to be paid for the half-year, carrying forward £2,768. Three additional cars will shortly be put into service.

London General Omnibus Company Dividend.—The directors have declared a dividend of 8 per cent., free of income tax, on the ordinary shares for the half year ended June 30, being at the same rate as last year. Owing to the acquisition of the assets of other omnibus companies, the dividend is now on the increased capital of £1,600,480, as against £1,150,480 last year.

London and Suburban Traction Company Dividend.—An interim dividend on the ordinary shares has been declared at the rate of 1 per cent. per annum for the six months ended June 30. This is the first dividend paid by the company on ordinary shares. The company was formed in November, 1912. It embraces the company tramway undertakings of the metropolis and their motor omnibus offshoots.

City of Carlisle Electric Tramways.—The accounts for the year 1913 show a total revenue of £9,922, and after providing for debenture and loan interest and writing £529 off suspense account, the debit balance of £665 brought forward was converted into a credit of £33. In order to pay for outstanding portion of the cost of reconstruction of the system, the directors recommend the creation and issue of £20,000 6 per cent. second debentures.

(Continued from page 90.)

TICKET INSPECTOR.

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WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 60 of the principal undertakings of the United Kingdom for the week ended July 25 give total receipts of £243,004, or £9,177 more than in the corresponding week last year. The total length of track was 2,863 miles, or 24 more than for the corresponding week. Receipts were at the rate of £84 17s. 6d. per track mile, an increase of £2 10s. 3d. as compared with the corresponding week of last year.

THE BRITISH ELECTRICAL FEDERATION.

The traffic statement for the week ended July 24, 1914, shows that the receipts from tramways and railways amounted to £43,388 as compared with £43,017 in the corresponding week last year, and from omnibuses £17,547, as compared with £11,650, making a total of £60,935, as compared with £54,667. The tramway and railway route mileage was 429.82, as compared with 428.47. Upon such of the services as were working both last year and this year the receipts show an increase of £213 upon the week.

RAILWAYS OF THE UNITED KINGDOM.

The summary of the official traffic returns of the fifty principal railways of the United Kingdom for the week ended July 26 gives a total of £2,624,418, which was earned on 22,162 miles, being at the rate of £118 8s. 4d. per mile of line open. For the corresponding week of 1913 the receipts of the same lines amounted to £2,656,323 with 22,137 miles open, or £119 19s. 10d. per mile. There was thus a decrease of £31,905 in receipts, an increase of 25 in mileage, and a decrease of £1 11s. 6d. in receipts per mile. Thirty-six of the returns distinguish between the receipts from passenger and goods traffic, and these show an increase of £14,569 (or 11s. 10d. per mile) in the passenger receipts and a decrease of £43,485 (or £2 1s. 3d. per mile) in the receipts from goods traffic. The aggregate receipts of the fifty railways since the beginning of the year amounted to £67,844,903, in comparison with £68,342,043 last year, a decrease of £497,140.

COPPER AND ALUMINIUM MARKET.

July 31, 1914.

Messrs. Henry R. Merton and Co., Ltd., 2, Metal Exchange Buildings, Leadenhall Avenue, E.C., supply the following quotations of prices per ton :—

	Friday, July 31.	Last week.	A Year Ago.
		£ s. d.	£ s. d.
Standard Copper (cash)	Metal Exchange closed.	59 12 6	68 15 0
,, (three months)		60 2 6	68 15 0
Electrolytic Copper—bars or ingots		63 10 0	71 10 0
Aluminium—bars or ingots		83 0 0	86 13 0

COAL MARKET.

July 31, 1914.

Messrs. Locket and Judkins, of 3, Fenchurch Avenue, E.C., report as follows :—

	Friday, July 31.	Last week.	A Year Ago.	Two Years Ago.
London, free into barge in Thames—	s. d.	s. d.	s. d.	s. d.
Best Admiralty Welsh (large)	27 6	27 6	25 6	22 6
Best Seconds	24 6	24 0	24 0	21 0
Ordinary Drys	21 0	21 0	21 0	20 0
Best Washed Nuts	20 6	21 6	21 0	19 0
Best Washed Peas	19 0	19 0	19 6	17 6
Cardiff, f.o.b.—				
Best Admiralty (large)	23 0	23 0	21 0	17 6
Best Seconds	23 0	19 6	19 6	16 9
Ordinary Drys	16 6	16 6	16 6	15 0
Best Washed Nuts	16 0	16 0	16 6	14 0
Best Washed Peas	14 0	15 0	15 0	12 6
Newcastle, f.o.b.—				
Best Steams	15 3	15 3	15 3	14 9
Best Seconds	12 6	12 6	13 6	12 9
Smalls	9 0	9 0	10 0	9 9

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Anglo-Argentine	July 22	£52,809	£53,124	29	£1,617,818	+ £670
Auckland..... (28 days)	June 5	20,007	20,919	49	247,311	+ 6,331
Ballarat and Bendigo	June 21	3,178	13,158	12	11,240	+ 93
Brazilian St. Rly. Mins	May	44,890	50,237	43	523,872	+ 76,026
Brazilian Traction.....	July 25	95,720	97,133	4	388,200	+ 8,334
Brisbane	June	25,018	28,590	25	168,975	+ 17,972
British Columbia .....$	June	680,693	660,383	52	8,789,287	+ 297,048
Buenos Aires Pt. & City	May	6,925	6,713	22	36,517	+ 3,206
Buenos Aires Lacrose .	June	44,078	44,139	52	534,545	+ 5,988
Calcutta.....Rs.	July 25	62 978	70,516	29	20,14,580	+ 114,232
Cape Town	April	12,175	13,408	17	55,889	+ 8,926
Carthagena & Herreria	June	2,158	1,405	26	13,796	— 3,585
Cordoba	June	13,416	13,583	18	41,977	+ 1,915
East India	June	1,892	1,966	48	21,020	+ 809
Kalgoorlie.....	June	2,854	2,692	26	15,522	— 1,704
La Plata.....	June	4,846	4,561	26	29,244	— 2,328
Lima.....	May	32,256	33,150	22	173,751	+ 6,825
Lisbon ..... Mirs.	May	...	178,215	..	...	...
Madras (14 days) Rs.	July 15	23,492	32,159	27	377,859	+ 30,201
Manila.....	June	134,500	182,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	357 500	+ 7,000
Mexico .....$	June	588,780	592,468	26	3,530,543	+ 265,005
Montevideo.....	June	28,820	28,049	35	257,246	— 1,167
Para	June	25,373	20,014	30	150,423	— 30,495
Port Elizabeth.....	April	4.357	3,758	17	16,633	+ 245
Puebla ..... $	June	61,300	62 000	26	380,800	+ 25,900
Rangoon	June	4 807	4,997	26	32,331	+ 992
Shanghai .....$	July 22	23,192	25,400	29	693,740	+ 100,778
Singapore .....$	July 25	12,486	11,520	29	356,905	+ 5,628
Toronto .....$	June	815,206	861,938	26	5,025,926	+ 370,410
Winnipeg.....$	June	321,037	335,012	26	2,091,552	+ 119,178

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TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	1914.	Incr. or Dec.	Aggregate. Wks.	1913-4.	Increase or Dec.
Aberdeen Corporation..	July 22	£2,010	£2,248	+ £208	8	£14,011	+ £1,236
Accrington Corp.	,, 22	517	627	+ 50	16	9,917	+ 513
Ayr Corporation	,, 25	1,218	1,249	+ 1	10	5,166	+ 259
Bath Electric	,, 22	1,284	1,305	+ 19	29	28,087	+ 2,166
Birkenhead Corp.	,, 26	1,276	1,247	— 29	16½	21,661	— 312
Birmingham Corp.	,, 25	11,379	12,307	+ 928	17	212,491	+ 18,538
Blackburn Corporation	,, 22	1,356	1,414	+ 58	17	21,694	+ 1,346
Blackpool Corporation	,, 23	2,910	3,051	+ 141	17	31,668	+ 4,322
Bolton Corporation	,, 26	2,859	2,816	— 53	17	48,349	+ 1,817
Bournemouth Corp.	,, 29	2 406	2 515	+ 109	17	37,651	+ 2,422
Bradford Corporation..	,, 25	6 006	7,077	+ 1,071	17	108,482	+ 7,388
Brighton Corporation..	,, 26	1,246	1,265	+ 19	16½	19,487	+ 1,594
Bristol	,, 24	8,925	9,450	+ 525	29½	249,738	+ 19,483
British Elec. Federatn	,, 24	54,667	60,935	*	...	...	...
Burnley Corporation ..	,, 25	1,752	1,640	— 112	17	28,945	+ 781
Burton-on-Trent Corp.	,, 26	288	325	+ 37	17	5,158	+ 350
Bury Corporation	,, 26	1,430	1,356	— 74	16½	23,823	+ 466
Cardiff Corporation	,, 18	2,838	3,103	+ 265	15	45,786	+ 2,932
Chatham and District..	,, 23	947	994	+ 47	29	26,660	+ 536
Chesterfield Corp.	,, 28	250	280	+ 30	16	4,628	+ 480
Colne Corporation	,, 25	311	323	+ 12	.	...	...
Cork Electric	,, 23	579	570	— 9	29	14 615	+ 277
Croydon Corporation ..	,, 17	1,697	1,847	+ 150	15	28,459	+ 2,186
Darlington Corporation	,, 25	266	298	+ 32	17	4 537	+ 312
Derby Corporation	,, 23	980	1,044	+ 64	16½	17,664	+ 1 050
Dover Corporation	,, 25	274	301	+ 27	17	4,262	+ 209
Dublin & Lucan	,, 24	211	186	— 25	3½	596	— 39
Dublin United	,, 24	6.824	6,595	— 229	29	171,405	— 2,668
Dundee City	,, 22	1,423	1,463	+ 40	9½	13,470	+ 563
East Ham Corporation	,, 25	941	1,091	+ 150	16½	18,143	+ 1,238
Exeter Corporation	,, 24	376	386	+ 10	17	6,185	+ 419
Gearless Mo'or 'Buses.	,, 25	628	485	— 143	30	14 040	+ 7,394
Glasgow Corporation ..	,, 26	14,921	15,126	+ 205	8	154,602	+ 8,634
Glossop(U.Elec.Supply	,, 25	137	126	— 11	30	3 737	— 90
Halifax Corporation ..	,, 21	2.273	2,257	— 16	16	36,748	+ 2,033
Hastings & District....	,, 22	1 224	1,263	+ 39	29	27,031	+ 572
Huddersfield Corp.	,, 25	2,194	2,337	+ 143	17	60,438	+ 4,841
Hull Corporation	,, 25	2,974	3,173	+ 199	17	53,839	+ 2,343
Ilford U.D.C.	,, 25	449	574	+ 125	16	9,193	+ 1,474
Ilkeston Corporation ..	,, 29	141	129	— 12	17	2,334	+ 15
Ipswich Corporation ..	,, 25	516	536	+ 20	16	8,329	+ 699
Isle of Thanet	,, 25	1,418	1,430	+ 17	43	22,362	+ 1,009
Kilmarnock Corp.	,, 25	203	193	— 10	10	1,804	— 66
Lanarkshire	,, 23	1,845	2,039	+ 194	29	56,041	+ 7,569
Lancashire United	,, 22	1,561	1,738	+ 177	29	48.106	+ 5,079
Leeds City	,, 23	8,564	9,035	+ 471	17	145,682	+ 6,729
Leicester Corporation..	,, 25	3,031	3,116	+ 85	30	86,851	+ 4,638
Leith Corporation	,, 25	753	895	+ 132	10	8,167	+ 465
Leyton U.D.C.	,, 23	1,333	1,438	+ 105	15	21 322	+ 1,301
Liverpool Corporation..	,, 25	13 819	13.710	— 109	29½	389,304	+ 12.332
Llandudno &Colwyn B.	,, 24	661	637	— 24	34	9 124	Nil
London County Council	,, 23	41,997	43,547	+ 1,550	16	717,517	+ 33.166
London Gnl. Omnibus..	,, 25	68,381	73,731	+ 5,350	30	1,910,406	+ 61 344
London United	,, 24	7 056	6,994	— 62	30	184 589	+ 2,412
Lowestoft Corporation	,, 25	309	359	+ 50	42	8,372	+ 865
Maidstone Corporation	,, 23	237	250	+ 13	17	3.702	+ 277
Manchester Corp.	,, 25	17.605	17,734	+ 129	17	303,695	+ 7.446
Met. Elec. Trys.	,, 24	9,326	9,617	+ 291	30	272,714	+ 6,939
Nat. Steam Car Co.,Ld.	,, 21	3,298	4,933	+ 1,635	37	158,969	+ 64,010
Nelson Corporation	,, 25	257	229	— 24	16½	3,654	+ 73
N'castle-on-Tyne Corp.	,, 25	4,666	5,222	+ 556	17	90,523	+ 9.0 7
Newport (Mon.) Corp...	,, 25	784	994	+ 210	17	14,488	+ 1,575
New St. Helens & Dist..	,, 22	837	906	+ 69	8	2,904	— 145
Northampton Corp	,, 21	561	613	+ 57	16½	10 023	+ 358
Nottingham Corp.	,, 23	3,302	3,553	+ 421	16½	58.427	+ 3,303
Oldham Corporation ..	,, 21	2,357	2.471	+ 114	18	41 811	+ 2,402
Portsmouth Corp.	,, 25	2,504	2,925	+ 421	17	42 815	...
Preston Corporation ..	,, 22	885	936	+ 51	17	15,400	+ 277
Provincial	,, 25	2,382	2,433	+ 51	42	80,199.	+ 4,485
Reading Corporation ..	,, 23	704	759	+ 55	16	12 036	+ 875
Rhondda	,, 23	1,270	1,263	— 7	29	36,106	+ 1,872
Rochdale Corporation	,, 25	1,703	1,640	— 63	17	27,911	+ 638
Rotherham Corp.	,, 29	1,056	1,080	+ 24	17	17,897	+ 951
Salford Corporation ..	,, 27	5,282	4,964	— 318	17	89.714	+ 326
Sheffield Corporation...	,, 26	7,515	7,794	+ 278	17½	139.938	+ 7.434
Southampton Corp.	,, 22	1,433	1,549	+ 114	16	22,729	+ 1,421
Southend-on-Sea Corp	,, 22	1,135	1,446	+ 261	17	17,914	+ 3,225
South Met. Trys.	,, 24	896	1,154	+ 258	30	32,748	+ 8,398
South Shields Corp.	,, 25	756	858	+ 102	16½	13,577	+ 1,688
Sunderland Corp.	,, 26	1.520	1,629	+ 109	17	25,801	+ 1,571
Sunderland District	,, 22	595	600	+ 5	38	22.288	+ 1,919
Swindon Corporation ..	,, 22	152	166	+ 14	16	2 8.5	+ 283
Torquay	,, 21	832	768	— 64	29	16 118	+ 595
Trys. (M.E.T.) 'Buses	,, 25	7.845	9,525	+ 1,680	30	268.472	+ 183,256
TynesideTrys.&Tmrds	,, 22	531	596	+ 35	4	1,839	+ 60
Wallasey Corporation	,, 25	1,324	1,454	+ 130	16½	22 501	+ 1,668
Walsall Corporation ..	,, 25	619	631	+ 12	30	18.674	+ 437
Walthamstow U.D.C....	,, 25	757	818	+ 59	17	14,360	+ 1,798
Warrington Corp	,, 23	486	486	+ 50	16	6,303	— 88
West Ham Corporation	,, 21	2,704	2,858	+ 150	16	47,5.0	+ 2,294
Wigan Corporation	,, 23	1,433	1,438	+ 5	16	24,818	— 513
Wolverhampton Corp	,, 29	1.147	1,038	— 159	18	19.291	+ 396
Yorkshire (W. Riding)	,, 23	1 460	1,518	+ 58	30	43 726	+ 1,264

* From such of the services as were working both last year and this year the receipts show an increase of £213 upon the week.

ELECTRIC RAILWAY TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	1914.	Incr. or Dec.	Aggregate. Wks.	1914.	Increase or Dec.
Central London	July 25	£4,296	£4,417	+ £121	30	£148,856	— £2,456
City and South London	,, 25	2,648	2,425	— 223	30	80.2?8	— 5,124
Liverpool Overhead	,, 26	1,829	1,695	— 134	30	51,398	+ 523
London Electric	,, 25	12.550	12,425	— 125	30	420.515	+ 1,440
Mersey	,, 25	2,137	2.149	+ 12	30	66.956	— 298
Metropolitan	,, 26	18.312	18,469	+ 157	30	549,857	+ 41,935
Metropolitan District	,, 25	12.737	12,583	— 174	30	393,909	— 190

The Tramway & Railway World can be obtained, post free, at the following rates:—

For the United Kingdom—Twenty-five Shillings per annum (including 64 issues, of which 12 are large illustrated numbers). One Shilling per Single Copy.
For places abroad—Thirty Shillings per annum.

Tel. No.: 2948 Gerrard.
Telegraphic Address: "Tramigro," London.

AMBERLEY HOUSE, NORFOLK ST., W.C.

TRAMWAY AND OMNIBUS SHARE LIST.

Paid.		On Week	Quotations. July 30.
...	Alabama Trac. Ltg. Power Co. 5% 1st Mt. Gd. Bds.	...	65½ — 68½
5	Anglo-Argentine Trams. Co., Lim., 5½% Cum. 1st Pref.	— 1/8	4 1/8 — 4 3/8
5	Do. 5½% Cum. 2nd Pref.	...	4⅛ — 4⅜
100	Do. 4% Deb. Stk. Red.	...	90 — 92
100	Do. 4½% Deb. Stk. Red.	...	97 —100
100	Do. 5% Deb. Stk. Red.	...	95 — 97
100	Auckland Elec. Trams Co. Ld. 5% 1st Mt. Db. Stk. Red	...	101 —104
1	Bath Electric Tramways, Lim. Pref. Ord	...	1/16 — 1/8
1	Do. 5% Cum. Pref	...	3/32 — 1/8
100	Do. 4½% 1st. Mort. Deb. Stock, Red.	...	70 — 75
100	Birmingham Dis. Pwr. & Trac. Co. Ld. 4½% 1st Db. Stk.	— ½	83¼ — 85¼
10	Blackpool and Fleetwood Tramroad Co.	...	13½ — 14½
	Bombay Elec. Supply and Trams. Co., Ord.	— ¼	13¼ — 14¼
10	Do. do. 6% Cum. Pref.	...	10¾ — 11¼
100	Do. do. 4½% Db. Stk Red.	...	95 — 97
$100	Brazilian Traction Light and Power Co. Lim.	— 1½	71½ — 74½
5	Brisbane Elec. Trams. Investment Co., Ltd., Ord.	...	7¼ — 7¾
5	Do. do. 5% Cum. Pref	...	4¾ — 5¼
100	Do. do. 4½% 1st Deb Stock, Red.	— ¼	100 — 108
10	Bristol Tramways and Carriage Co.	...	5¼ — 5¾
10	Do. do. 4% Cum. Pref.	...	7 — 7¾
100	Do. do. 4% Deb. Stock	...	100 —102
100	Do. do. 4½% Deb. Stock	...	95 — 97
100	British Columbia Elec. Rly. Co., Lim., Def. Ord. Stck.	— 2	104 —108
100	Do. Pref. Ord. Stock	— 4	100 —104
100	Do. 5% Cum. Perpetual Pref. Stock.	— 1½	101 —104
100	Do. 4½% 1st Mort. Debs.	...	93 —101
40	Do. 4½% Vancouver Power Debs.	...	92 — 96 xd
100	Do. 4½% Perpetual Cons. Deb. Stk.	— ½	95 — 97
100	British Elec. Traction Co., Lim., 6% Cum. Pref.	...	85 — 89
100	Do. 7% Non-Cum. Pref.	...	54 — 57
10	Do. 6% Pref. Ord. Non-Cum.	...	16½ — 18¼
100	Do. Deferred Ord. Stock	...	10 — 12
100	Do. 5% Perpetual Debenture Stock.	...	91 — 93
100	Do. 4½% Second Debenture Stock, Red	— 1	75 — 78
100	B. Aires Port & City Trms. 6% 1st Deb. Stk. Red.	— 2	68 — 73
100	Buenos Ayres Lacroze Trams. Co., Stg. 5% 1st Mrt. Deb.	...	99 —101
5	Calcutta Tramways Co., Limited. Ord.	+ ⅛	7 — 7⅛
5	Do do. 5% Cum. Pref.	...	4 1/16 — 5 3/16
100	Do. do. 4½% 1st Deb. Stock, Red.	...	98 —101
1	Cape Electric Tramways, Ld.,	...	⅝ — ¾
10	Carthagena and Herrerias Steam Tramways Co., Lim.	...	2¾ — 3⅛
100	Do. 5% Debs. Red.	...	86 — 89
5	City of Buenos Ayres Trams. Co (1904), Lim.	...	5⅜ — 5⅝
100	Do. 4% Debenture Stock Red, 1985	...	95 —100
100	Colombo Elec. Trys. and Ltg. Co. 5% 1st Mort. Deb.	...	93 — 97
100	Companhia Ferro Carril do Jardim Botanico, 6% 1st Mt.	— 1	92 — 94
10	Cork Electric Tramways and Lighting Co. 6% Cum. Pref.	...	— 6½
10	Dublin United Trams. Co. (1896) Lim. Ord.	...	— 10⅞
10	Do. do. 6% Pref.	...	— 12⅛
100	Do. do. "A" Red.	...	— 80¼
100	Do. do. Deb. Stock "B" Red.	...	— 79⅛
10	Gateshead & Dist Trys. Co., Ord.	...	8¼ — 9
10/-	Hastings & Dist. Electric Trams. Co. Ld., Ord.	...	1/16 — 1/8
1	Do, do. 6% Cum. Pref.	...	3/32 — 1/8
100	Do. do 4½% Deb. Stk. Red.	...	65 — 70
$1,000	Havana Electric Railway, Con. Mort. 5% Bonds	...	91 — 95 xd
100	Hong Kong, Tramways Co., 5% Mort. Bds. (Regd.)	...	85 — 90
10	Imperial Tramways, Ord.	...	3¾ — 3⅝
10	Do. do. 6% Cum. Pref.	...	6¼ — 6½
100	Do. do. 4½% Deb. Stock	...	74 — 75
5	Isle of Thanet Elec. Trams. & Ltg. Co., 5% Cum. Pref.	...	2 — 2½
100	Do. 4% Debenture Stock	...	71 — 76
1	Kalgoorlie Elec. Trams., Ltd.	...	...
100	Do. do. 5% "A" Deb. Stk.	...	82 — 87
100	Do. do. 6% "B" do.	...	10 — 20
7/6	La Plata Elec. Trys. Co., Lim., 6% Cum. Pref.	...	3/32 — 3/16
10	Lanarkshire Tramways Co.	...	9½ — 10¾
100	Lancashire United Tramways, 5% Prior Lien Deb.	...	84⅛ — 86¼
1	Lisbon Electric Trams., Lim., Ord.	...	1 3/32 — 1 5/32
1	Do. 6% Cum. Pref.	...	— 1¼
100	Do. 5% Mort. Debs.	...	92½ — 97½
1	London and Suburban Trac. Co., Lim., Ord.	...	1/16 — 3/32
100	London General Omnibus Company, Limited, 4½% Deb.	...	99 —101
100	Do. Do. 5% Cum, Inc. Deb. Stk. Red.	...	87 — 90
100	London United Trms.(1901) Ltd., 4% 1st Mt. Deb. Stk. Red	...	53 — 57
100	Madras Electric Trams. (1904) Lim., 6% Cum. Pref.	...	4⅞ — 5¼
5	Do, do. 5% Deb. Stk., Red.	...	93 —101
100	Manaos Trys. & Ltg. Co., 5% 1st Debs., Red.	...	75½ — 78½
$100	Manila Electric R.R. and Lighting Corp. Capital Stk.	...	100 —104
$1,000	Do. do. 5% Bds.	...	100 —102
1	Mansfield and Dist. Trys. Ltd. 6% Cum. Pref.	...	1/8 — 1/4
100	Metropolitan Elec. Trms. Ltd. 4½% Deb Stock, Red.	...	84 — 87
100	Do. 5% Deb. Stock, Red.	...	85½ — 88½
100	Mexico Tramways Co., Common Stock	— 9¾	60 — 65
500	Do. Gen. Con. 1st Mort. Gld. Bonds	— 1	82 — 86
100	Do. 6% 50-yr. Mort. Bonds	— 3	74 — 78
...	Michigan United Railways 5% 1st Mort. Gld. Bonds	...	90 — 92
100	Montreal Street Railway, Sterling 4½% Debs. (1922)	...	99 —101
100	Do. 4½% Sterling Debs, (1922)	...	98 —100
1	National Steam Car Co. Ltd.	— 32	13/32 — 17/32
10	Oldham—Ashton and Hyde Elec. Ord.	...	6 — 6½
10	Do. do. 5% Cum. Pref.	...	5⅞ — 6⅛
5	Para Elec. Rlys. and Ltg. Co., Ord.	...	4 — 4⅛
5	Do. do. 6% Cum. Pref.	...	4 — 4⅛
1	Perth (W.A.) Elec. Trams. Ld., Ord.	...	—
1	Potteries Electric Traction Co., Ltd., Ord.	...	3/32 — 1/8
1	Do. 5% Cum. Pref.	...	1/8 — 3/16
100	Do. 4½% Debenture Stock, Red.	...	81¾ — 84¾
1	Provincial Tramways, Lim., Ord.	...	1/8 — 1/8
10	Do. 5% 1st Deb. Stock	...	98 —103
...	Puebla Tramway, Light & Power Co., Prior Lien 5%	...	69 — 74
5	Rangoon Elec. Trams. & Supply Co., 6% Cum. Pref.	...	5 — 5¼
100	Do. do. 4½% 1st Mt. Db. Stk	...	94 — 98
100	Rhondda Tramways Co., 5% 1st. Mt. Debs.	...	87 — 89
$500	Rio de Janeiro Trys. Lgt & Pr. Co. 1st Mt. 30 yr. 5% Gd. Bds.	— 1	96 — 98
100	Do. do. 5% 50-yr. Mort. Gold Bonds	...	89½ — 91½
$500	Sao Paulo Tr. Light & Power, Co. 5% 1st Mort. Debs. 1929	...	97 —101
100	Do. do. 5% Perp. Cons. Debs.	...	98 —101
10	Shanghai Elec. Construction Co.	...	12½ — 13½
100	Singapore Elec. Tramways Lim., 5% Debs. Red	...	88 — 93
	South Met. Elec. Trams. and Ltg. Co., 6% Cum. Pref.	...	...
100	Do. do. 4% Deb. Stk.	...	64 — 68
...	Southern Elec. Trys. Co. of B.A., 5% 1st Mrt. Debs.	...	99 — 102
100	Toronto Railway Co., 1st Mt. 4½% Sterling Bonds	...	97 — 99
100	Toronto Suburban Rly. Co., 4½% 1st Mort. Deb. Stock	...	78 — 80
100	Tramways (M.E.T.) Omnibus Co., 4½% Gtd. Deb. Stk.	...	90 — 92
5	United Elec. Tramways of Monte Video, Ord.	...	4¼ — 4¾
5	Do, do. 6% Cum. Pref.	...	4⅝ — 5⅛
100	Do. do. 5% 1st Deb. Stk. Red.	...	95 — 97
100	Winnipeg Elec. Rly. Co. 4½% Perp. Cons. Deb.	...	93½ — 95½
5	Yorkshire (West Riding) Elec. Trys. Co., Ord.	...	⅛ — ⅜
5	Do. do. 6% Cum. Pref.	...	4⅛ — 4¾
100	Do. do. 4½% 1st Deb. Stock. Red.	...	84 — 87

* The Stock Exchange was closed yesterday owing to the critical international situation.

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THE

Tramway & Railway World

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NOTICES.

All Communications and Advertisements for next week's issue should be received not later than 3 p.m. on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

CITY AND COUNTY BOROUGH OF BELFAST.

TRAMWAYS AND ELECTRICITY DEPARTMENT.

The Tramways and Electricity Committee of the Belfast Corporation are prepared to receive tenders for the supply of an

Electric Motor Tower Waggon.

Specification, with form of contract, may be obtained from Mr. T. W. Bloxam, City Electrical Engineer, East Bridge Street, Belfast, on deposit of one guinea for each specification. This deposit will be refunded, provided a *bona-fide* tender has been sent in, and not withdrawn.

Extra copies may be obtained at 10s. each, which sum will not be returnable.

Sealed tenders, endorsed "Tender for Electric Motor Tower Waggon," to be lodged in my office, not later than 10 a.m. on Monday, August 24, 1914.

The lowest or any tender not necessarily accepted.

A tender if sent by post must be registered; if delivered by hand, an official receipt must be obtained for it, otherwise the undersigned will not be responsible.

R. MEYER,
Town Clerk.

COUNTY OF LONDON.

The London County Council invites tenders for (*a*) High and Low Tension Cables, etc., and (*b*) Laying Stoneware Ducts in connection with the London County Council Tramways.

The specifications, bills of quantities, forms of tender, etc., may be obtained from the Clerk of the Council, at the County Hall, Spring Gardens, S.W., after payment to the Cashier of the Council of £2 in respect of each section of work. This amount will be returnable only if the tenderer shall have sent in a *bona-fide* tender, and shall not have withdrawn the same. The contract documents may be inspected before the payment of the fee.

The person whose tender is accepted will be bound by the contract to pay wages at rates not less, and to observe hours of labour not greater, than the rates and hours set out in the Council's list. Particulars of the Council's Standing Orders as to its conditions of tender and contract are given in every issue of the *London County Council Gazette*. No tender received after 11 a.m. on Tuesday, September 8, 1914, will be considered.

The Council does not bind itself to accept any tender.

LAURENCE GOMME,
Clerk of the London County Council.

County Hall, Spring Gardens, S.W.

BURY CORPORATION.

The Corporation of Bury invite tenders for the supply of Materials for the Permanent Way and Overhead Equipment of 1½ miles of Tramways.

On and after August 8, 1914, specification and form of tender may be obtained from the Tramways Manager, Market Place, Bury.

GREAT INDIAN PENINSULA RAILWAY COMPANY.

The Directors are prepared to receive tenders for the supply of the following Stores, namely:—

Railway Tickets, etc.
Miscellaneous Articles and Materials

Specifications and forms of tender may be obtained at this office on payment of the fee for the specification, which payment will not be returned.

Tenders must be delivered in separate envelopes, sealed and addressed to the undersigned, marked "Tender for Railway Tickets," or as the case may be, not later than 11 o'clock a.m. on Thursday, August 13, 1914.

The Directors do not bind themselves to accept the lowest or any tender.

R. H. WALPOLE,
Secretary.

Company's Offices,
48, Copthall Avenue, London, E.C.,
August 5, 1914.

GREAT NORTHERN RAILWAY COMPANY (IRELAND).

The Directors are prepared to receive tenders for Twelve Steel Carriage Underframes, 58ft. long.

Copies of the specification, drawings, and form of tender may be obtained on application to the Secretary at Amiens Street Terminus, Dublin, on payment of a fee of ten shillings.

Tenders, under cover, marked "Tender for Underframes," should be delivered to the undersigned not later than 10 a.m. on Monday, August 24, 1914.

The Directors do not bind themselves to accept the lowest or any tender.

T. MORRISON,
Secretary.

Secretary's Office,
Amiens Street Terminus, Dublin,
August 5, 1914.

COUNTY BOROUGH OF OLDHAM.

ELECTRICITY WORKS.

The Oldham Corporation Electricity Committee invite tenders for the supply, delivery, and erection of:—

(1) Three Economisers.
(2) Three Induced Draught Fans and Motors.

Copies of the specification, prepared by Mr. Robert Blackmore, A.M.I.E.E., can be obtained from the Engineer, Electricity Works, Oldham, on payment of two guineas, to be returned by the Corporation on receipt of a *bona-fide* tender.

The Corporation do not bind themselves to accept the lowest or any tender.

Tenders must be sent to the Engineer at the above address on or before August 24, 1914.

J. H. HALLSWORTH,
Town Clerk.

Town Hall, Oldham,
July 22, 1914.

COUNTY BOROUGH OF OLDHAM.

ELECTRICITY WORKS.

The Oldham Corporation Electricity Committee invite tenders for the supply, delivery, and erection of Storage Battery, Reversible Booster and Switchgear.

Copies of the specification, prepared by Mr. Robert Blackmore, A.M.I.E.E., can be obtained from the Joint Electrical Engineer and Manager, Mr. Fred L. Ogden, Electricity Works, Greenhill, Oldham, on payment of two guineas, to be returned by the Corporation on receipt of a *bona-fide* tender.

The Corporation do not bind themselves to accept the lowest or any tender.

Tenders must be sent to the Electricity Works at the above address on or before Monday, August 24, 1914, endorsed "Storage Battery."

J. H. HALLSWORTH,
Town Clerk.

Town Hall, Oldham,
August 4, 1914.

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SOUTH INDIAN RAILWAY COMPANY, LTD.

The South Indian Railway Company, Limited, are prepared to receive tenders for the supply of :—

Carriage Fittings (metre gauge), Wrought Iron and Steel, Hardware, Screws, and Sundries.

Specifications and forms of tender may be obtained at the Company's offices.

Tenders, addressed to the Chairman and Directors of the South Indian Railway Company, Limited, marked "Tender for Carriage Fittings (Metre Gauge)," must be left with the undersigned not later than 1 o'clock on Wednesday, August 26, 1914.

The Company is not bound to accept the lowest or any tender.

A charge, which will not be returned, will be made of 20s. for each copy of the specification.

Copies of the drawings may be obtained on payment at the offices of Robert White, Esq., M.Inst.C.E., Consulting Engineer to the Company, 3, Victoria Street, Westminster, S.W.

By order, V. E. de Broe, M.Inst.C.E.,
for Managing Director.

Company's Offices,
91, York Street, Westminster, S.W.,
August 4, 1914.

VICTORIAN STATE RAILWAYS.

The Agent-General for Victoria, Australia, invites alternative tenders for the supply and delivery, f.o.b. port of shipment, and c.i.f. one of the railway piers at Williamstown, Melbourne, fully inclusive of Australian Customs, Duties, etc., of the following Rails and Fishplates :—

Contract 26,600.—Approximately 28,920 Tons of 80 lb. Steel Rails.

Contract 26,600.—Approximately 2,321 Tons of Fishplates for 80 lb. Rails.

Specifications, conditions of contract, and forms of tender may be obtained by *bona-fide* tenderers at the offices of the Consulting Engineers, John Coates and Co., Limited, 115, Victoria Street, Westminster, London, S.W.

Tenders must be delivered to the Agent-General for Victoria, Melbourne Place, Strand, London, W.C., endorsed on the outside "Tenders for Steel Rails and Fishplates—Contract 26,600," not later than 11 a.m. on Wednesday, September 2, 1914.

A preliminary deposit equal to ninepence for each and every ton of rails and fishplates tendered for must accompany each tender.

The Government of Victoria does not bind itself to accept the lowest or any tender.

Peter McBride,
Agent-General for Victoria.

POSITION VACANT.

PUBLIC WORKS DEPARTMENT, NIGERIA.

Assistant Electrical Engineer required for the Public Works Department, Nigeria. Age between 25 and 35; preferably unmarried. Strict medical examination.

Salary £300, rising by £10 yearly to £350. Free single quarters provided and first-class passages out and home again.

Two months' leave in England on full pay after 12 months' tour, increased to 4 months if returning to the Colony.

Candidates must have had a good mechanical and electrical training, central electrical station experience, and knowledge of working and maintenance of Diesel oil engines.

Application by letter, stating age, experience, whether married or single, copies of any recent testimonials and names and addresses of personal references, should be sent on or before August 12 to Messrs. Preece, Cardew, and Snell, 8, Queen Anne's Gate, Westminster, S.W.

Quote M/7125 in left hand top corner of envelope and application.

READING CASES
To hold 26 Saturday Issues of
"THE TRAMWAY AND RAILWAY WORLD,"
May be obtained from the Publishers,
Price **2s. 6d.**, postage included.

Whenever you are repainting your poles ask for samples of the Kearsley ready-mixed POLE PAINTS as supplied to important Companies at home and abroad. These Paints are durable, retain their colour during exposure, and prevent rust. Information free on request.
Robert KEARSLEY & Co., Ltd.
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160, WOODHOUSE LANE, LEEDS.
Sole Manufacturers of
TURNER'S PATENT AUTOMATIC POINT CONTROLLERS.
Telegrams: "Controllers, Leeds." Telephone: 3488 Leeds.
OVERHEAD LINE MATERIAL AND SUPPLIES.

MILLARS' TIMBER AND TRADING CO., LTD.
PINNERS' HALL, GREAT WINCHESTER STREET, LONDON, E.C.
SUPPLY
JARRAH
THE SANITARY WOOD PAVING
REGISTERED TRADE MARK. M.J.
Telegrams: "Jarrah, London." Telephone: 368. London Wall.

SIMPLEX CONDUITS, Ltd.
GARRISON LANE, BIRMINGHAM.
Makers of Simplex Steel Conduit System and
WIRES and CABLES.
BITUMEN CABLES.
TRAMCAR HEATERS.
TRAMCAR METERS.
MEASURING INSTRUMENTS.
WATERTIGHT FITTINGS FOR CAR SHEDS.
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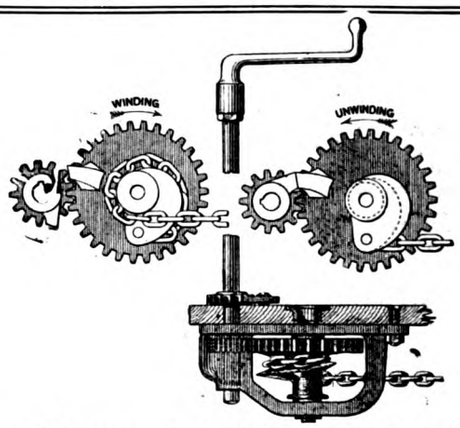

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THE
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SATURDAY, AUGUST 8, 1914.

THE "OCEAN"
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METHODS OF INCREASING REVENUE.

It is, after all, only a few years since the protection from the weather of passengers on the upper decks of electric cars came to be regarded as of much importance. Perhaps the feature of electric traction which led in the first place to the idea of roof covers was the high speed of the cars which made a head wind, if one was blowing, have the effect of half a gale. The rain also was driven into the clothing of top-deck passengers owing to the car's speed. If it is not in the recollection of people now living, it is, at all events, well known that on the early railways third-class passengers were conveyed in open wagons or carriages, and the idea to give them protection from the weather only came subsequently. The roof cover of the tramway car has not, however, developed quite in the way originally anticipated, because the first idea certainly was to have some sort of light canopy which might be opened in whole or in part in fine weather. Nothing of the sort, however, has come into practical use, and the roof covers of to-day may almost be likened to another car body perched on top of an ordinary car. We cannot help thinking that in many cases it is unduly heavy, but in any event it serves the great purpose of being an earner of increased revenue. In really wet weather the carrying capacity of a car with no roof cover is cut down by at least a half, because people will not go on the upper deck. The fitting of a top canopy, therefore, doubles the carrying capacity of the car and correspondingly increases the revenue. Owing probably to the desire for fresh air, a good many tramway authorities in this country have been slow in adopting the covered-in top, but the addition to the traffic receipts is so pronounced that the number of uncovered cars in the country is steadily diminishing, and they are likely soon to be in a very small minority. Another change which promises to be a powerful agent in increasing traffic receipts without anything like a corresponding increase in working expenses is the use of trailer cars. This system, however, is as yet in its infancy in this country, but the prospects for it are very hopeful. During the session of Parliament just ending, several Bills have been passed authorising tramway authorities to use trailer cars. It must also be remembered that the Board of Trade, if they choose, have the power to authorise the running of trailer cars, and this somewhat neglected power may now be more freely exercised seeing that the Bills above referred to have been passed. The classic example in this country of the use of trailer cars on electric tramways—we make no mention of the steam days—was that of Leeds, where in the early days of electric traction trailer cars were employed, and the working expenses account showed that the cost of running per trailer car mile was very much less than that per motor-car mile. On the recent occasion when the London County Council gave an order for 150 trailer cars, it was mentioned in a report by the Highways Committee that, according to the best estimate, the cost of running a trailer car would be £338 per annum less than the cost of running an electric motor-car. A train of two cars can, of course, be looked after by three men, so there is a man's wages saved as compared with two separate cars. In addition, a trailer car is very light compared to a motor-car, and accordingly requires less current to haul it. We do not here take into consideration the question of the relief of street congestion by the use of trailer cars, but confine attention simply to the effect on revenue from the use of two-car trains in all circumstances where there is sufficient traffic to warrant the running of them. It can hardly be doubted that trailer cars will be employed in all the larger towns of the country, and that the financial results will prove highly gratifying.

MANCHESTER TRAFFIC PROBLEM.

A voluminous report by the Manchester Watch Committee on street traffic congestion has now been issued. The Tramways Committee have already presented a report on the subject, and a report from the Improvements Committee is expected shortly. For the purposes of these reports deputations have visited various large cities on the Continent and in America.

The present report states that there is an inner area in Manchester where the congestion is rapidly creating a crisis which can only be met by the exercise of a firm control supported by adequate statutory powers.

The report proceeds to declare the primary cause of the congestion to be the insufficient width of streets, and then goes on to discuss remedies. The first point for serious consideration is the urgent necessity for increased statutory power to control and regulate the traffic in the streets. The powers at present are admittedly totally inadequate. To be of effective use in the reduction of traffic congestion, powers should be obtained by which the controlling authority could make regulations:—

1. Compelling slow-moving vehicles to keep to the left or near side of the road at all times, except when passing another vehicle or to avoid an obstruction or to prevent an accident.
2. Prescribing routes, position on highway, and times of use of—(a) through traffic, (b) heavy traffic, (c) slow traffic, (d) fast traffic.
3. Prescribing speed limits for mechanically propelled vehicles.
4. To impose a reduced speed limit on traffic entering main roads.
5. To prohibit vehicles passing on the near side of a tramcar when discharging or receiving passengers; and
6. To prescribe routes and times of use of streets for all processions and demonstrations.

It is essential to limit the use of certain streets. This, in effect, is either to exclude specified traffic, or, alternately, to create prescribed streets as "one-way" streets during scheduled hours. The state of traffic is such that it is desirable the powers of the Corporation should be exercised to impose a reduced speed for motor cars. This would reduce the number of accidents and the free movement of traffic would be facilitated. It would be necessary to impose the same speed limit on tramcars.

The suggested scheme of speed control is as follows:—

1. All main arterial roads radiating from the central area of the city will be regarded as main arterial roads, with a preferential

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right to the user thereon of the maximum speed throughout consistent with traffic conditions.

2. All main roads, other than those specified in paragraph 1, will be allowed the ordinary maximum speed limit except for a reasonable distance from the point where a main arterial road crosses or intersects such road, when the speed must be reduced to four miles per hour.

3. On all other roads and at all other crossings and intersections the speed must be reduced to four miles per hour before approaching such crossing or intersection.

Limitation of tramway traffic is recommended during certain hours, and it is stated that the adoption of this suggestion would, next to widening the streets, do more to relieve traffic congestion in the central area than any other course. The tramcars should be considerably reduced in number, or entirely excluded from the central area between the hours of 10 a.m. and 5 p.m.

The report then refers to such expensive remedies as widening streets, making new streets, etc. As regards means to prevent accidents to children, these could well take the form of :—(a) A compulsory stop of all tramcars when passing a school; (b) a much reduced speed limit for all vehicles when passing schools, with a compulsory stop if children were actually crossing the street; (c) the erection of signs warning drivers; (d) the provision of more recreation grounds for the use of children after school hours and during holidays.

The movement of traffic would be much facilitated if there were adopted a uniform system of signalling the intended direction of each moving vehicle. The adoption of a mechanical indicator, illuminated at night, and carried by both fast-moving and slow-moving vehicles, would tend to the reduction of accidents, and would facilitate the free and safe movement of traffic generally.

The establishment of a joint committee of the several departments concerned, under an independent chairman, would without doubt reduce considerably, if not the amount, the period of street obstruction by Corporation street works.

JAMAICA TRAMCAR FARE APPEAL.

The Judicial Committee sitting at the Law Courts, London, on July 29, heard an appeal in the action Campbell *v.* the West Indian Electric Company, which was brought to recover the sum of sixpence. The tramways are worked under powers conferred by the Kingston and St. Andrew Tramways License, 1897. For the purpose of charging fares and tolls the area is divided into three districts, and the fare charged is 2d. for one journey between any two points in one district. Plaintiff's claim was, that so long as a passenger made a journey within the limits of one district, payment of one fare of twopence entitled him to travel in the cars over the whole of it, in any combination of cars he chose to devise. The company claimed a fresh fare for every change, either from car to car or from route to route in the same car within any one district. The Courts below decided against the appellant. Lord Sumner, in delivering the judgment of the Judicial Committee, said they were of opinion that three 2d. fares were rightly charged, and that the decision of the majority in the Court below was right, and they would therefore humbly advise His Majesty that this appeal should be dismissed, with costs.

In a second appeal—the West India Electric Company, Limited, *v.* the Attorney-General for Jamaica—their lordships held that the company had the right under the license to charge each passenger for one journey by any one car between any two points on its regular route in one district a fare not exceeding 2d., and was not under obligation to run any of its cars over more than one of the routes, which it fixes by public announcement, or to give transfers or transfer tickets. The company were therefore successful in their appeal.

MISCELLANEOUS NEWS AND NOTES.

Electric Welding.—Paisley Tramways Company are having 210 rail joints electrically welded.

Electric Omnibuses at South Shields.—Two electric omnibuses were on July 30 put into service in connection with the South Shields tramway service. Each 'bus seats 22 passengers, and Edison accumulators are used.

Sante Fe Electric Tramways.—*The Review of the River Plate* states that the second section of the Sante Fe electric tramways is now open. Efforts are being made in Esperanza to induce the company to extend its lines to that city.

The Edison and Swan United Electric Light Company, Limited, notify us that owing to important Government business they have been compelled to abandon the holidays fixed for the present week, and they re-opened on Monday last, August 3.

The International Tramway Congress.—We are officially informed that the biennial congress of the Permanent International Tramways Union, which was to have been held in Budapest at the beginning of September, has been abandoned in consequence of the war.

Railway Electrification in Lancashire.—It is reported that the Lancashire and Yorkshire Railway Company in addition to electrifying their lines between Manchester and Bury intend to convert to electric working the lines in central and south-east Lancashire.

Croydon Tramways Committee have adopted a recommendation by Mr. T. B. Goodyer, the tramways manager, in favour of obtaining a motor tower wagon for facilitating the work of overhead wiring repairs. The committee have been authorised to obtain tenders for the supply of the wagon.

Motorists and the War.—The Royal Automobile Club, Pall Mall, will be glad to receive the names of members and associates who will offer the services of their cars or their services with their cars either for home or foreign service, in case of need. The make and horse-power of the car should be stated.

Efficient Lifeguards at Croydon.—Between March, 1913, and the end of February in the present year the lifeguards fitted upon the tramway cars operated by the Croydon Corporation were brought into service on fifteen occasions. In every instance they proved effective; in nine cases the person caught suffered no injury.

Assistant Conductors.—A deputation of tramwaymen on July 28 waited on the Highways Committee of the London County Council and objected to the employment of youths to assist the conductors on the Tooley Street cars. The men were informed that the experiment was to be limited to one route, and that not more than 40 boys would be engaged.

Omnibus Traffic in London.—The House of Commons have concurred in the resolution of the House of Lords for the appointment of a Joint Committee to inquire into the law relating to the running of motor omnibuses and trolley vehicles, and what contribution, if any, should be payable towards the cost of road maintenance by the proprietors of such vehicles.

New Cars for Brighton.—Three new cars have been added to the Brighton tramway rolling stock. These are the first cars that have been built in the works of the Brighton tramway department. They are very handsome and show various detail improvements. The work has been carried out under the supervision of Mr. Wm. Marsh, the engineer and manager of the tramways.

The Municipal Tramways Conference.—In authorising Councillor G. A. Johnston, chairman of Dundee Tramways Committee, Councillor W. H. Buist, and Mr. Peter Fisher, general manager, to attend the annual conference of the Municipal Tramways Association at Salford in September, the Dundee Corporation gave the delegates power to invite the Association to Dundee in 1915.

Yorkshire Woollen District Wages.—The employees of the Yorkshire (Woollen District) Electric Tramways have decided to accept the offer of the directors. The effect of this is that there will be an increase of ½d. per hour. The system of badges for long service is to be abolished, but the increase of pay is more than an equivalent for this. Under the new rate the maximum will be 7¼d. per hour for drivers and 6¼d. per hour for conductors. The shed staff also receives an increase all round.

A Tramcar Wrecked by a Traction Engine.—A strange accident occurred on the Aberdeen tramways at Kittybrewster on August 5, when a traction engine collided with a corporation tramcar, with the result that the car was wrecked. It seems that the traction engine was being turned into a side street, when it rammed the car from the side and perched itself in the front part, tearing away the stair and wind screen and the driving gear. Fire broke out in the wreckage, but was speedily extinguished. The driver of the car had a most fortunate escape, though he was injured about the face and body and scalded with steam from the traction engine.

The London Linking-Up Scheme.—In nearly every case the borough councils affected by the project of the Highways Committee for linking up the dead ends of the tramway system are expressing their objections. The total extensions would necessitate the construction of only about five miles of track, but with street improvements it is estimated that the cost would be nearly £1,000,000. Apparently the only extension which is not likely to be opposed is the suggested joining up of Waterloo Station with Blackfriars Bridge by means of a line through the poorer class streets known as New Cut and Great Charlotte Street. Westminster Council allege that Victoria Street is not wide enough to be used for a line linking up Victoria Station and Westminster Bridge.

Middlesex County Council Tramways.—In the seventh annual report of the Light Railways and Tramways Committee of Middlesex County Council it is stated that the capital expenditure amounts, subject to audit, to £1,801,525, including £64,319 for capitalised interest at 4 per cent. per annum, calculated from the date the expenditure was incurred until the opening for traffic of the various light railways. A tabulated statement shows that the total amount received from the company was £462,120. The County Council received no "share of profit on revenue account," in 1912, and a foot note explains that the audit for 1913 is not completed. The County Council has received £77,593 in respect of interest on capital expenditure for 1913. There is a reconstruction and renewal fund of £124,628, to which has to be added interest received in investments, making a total of £131,933. In 1913, the traffic receipts amounted to £475,759, as compared with £461,942 in the previous year. The number of car miles run was 12,255,429 and 11,482,870 respectively, and the average earnings per car mile, 9.31d. in 1913 and 9.65d. in 1912. The number of passengers increased from 28,842,989 in 1905 to 91,508,693 in 1912, and 94,426,011 in 1913.

An Interesting Decision.—In Glasgow Sheriff Court, Sheriff Lyell has given judgment in an action by Miss W. J. Graham against Mr. James Arneil, contractor, Glasgow, for damages in respect of personal injuries sustained on January 22 through being crushed between a projecting plate on one of defender's lorries and a tramway car from which she was alighting at the tramway stopping place at Kelvinhaugh Street, Glasgow. The Sheriff found that the accident was due to the fault of the lorryman, but that it was materially contributed to by pursuer's negligence, and that in the circumstances she was not entitled to damages. The Sheriff in his judgment stated that it had been said that the lorryman did not know the car was beside him until he heard pursuer's screams, whereupon he instantly stopped his horse. He did not see pursuer, or know she was there. He was walking at his horse's head, had his horse under complete control, and was in no way to blame for

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the accident. How was it that the lorryman did not see the car? The simple explanation was that he was leading his horse on the near side, and the horse and lorry effectually obstructed his view of traffic overtaking him. That was, of course, an old controversy. It was true that when walking at the near side a driver could lead his horse with his right hand, but there all the advantage ceased. It appeared to him that the *raison d'être* for a driver sitting on the whip or off side of the driving seat of a fast moving carriage applied equally to the driver of a lorry, whether he was sitting on the lorry or walking at the horse's head. In each case he was in the best position at the off side for observing traffic approaching from the front or from the rear. But, without seeking to dogmatise generally on the subject, the Sheriff had no hesitation in holding that a driver was to blame if an accident occurred which he could have prevented had he been in a position to observe its imminence, if, as a matter of fact, he had voluntarily and unnecessarily placed himself in such a position that he was unable to see. The Sheriff then detailed the contributory negligence of the pursuer, who stepped off the car thinking that the lorry had stopped.

Tramways v. Omnibuses at the Busy Hours.—In the report on the accounts of the London County Council Tramways for the year ended March 31, presented by the Highways Committee, the following paragraph occurs:—"Assuming it were economically possible for the omnibus to expand its service to meet the requirements of traffic at the busy hours, the effect of the congestion in the street would be very serious, as, for the carriage of a given quantity of traffic, motor omnibuses would occupy much more space than tramcars. If electric cars were entirely withdrawn and the same seating accommodation had to be provided by motor omnibuses as is now provided by tramcars, 3,109 omnibuses, or an increase of 114 per cent. of vehicles over the number of tramcars would be required during the fine weather, while during inclement weather when only the inside seats of omnibuses are usable, 7,513 omnibuses, or an increase of 418 per cent. would be required." In conclusion the report states:—"The Committee feel sure that the Council will agree that every possible step should be taken to improve the present position of the tramways and still further to add to the utility of the great service they perform in coping with the problem of passenger transport in London. In particular the Committee would urge that every facility should be given for the pressing forward of the necessary linking up of the tramway system, and that, as regards the exceptional financial burdens placed upon it in so many respects, action should be taken with a view to such burdens being more equally shared with other means of locomotion. If the tramways are to be placed on a remunerative basis it is of paramount importance that means should be devised whereby this linking up and extension may be accomplished with the least possible delay."

CONTRACTS AND ORDERS.

Croydon Corporation have purchased an electric motor car from Edison Accumulators, Ltd., at £516. It is to be used by the electricity department.

Bexley Council have provisionally accepted the tender of the British Insulated and Helsby Cables, Limited, for 3,500 yards of feeder cables at £1,200.

The L.C.C. Highways Committee have been authorised to invite tenders from selected firms for the supply of fittings required for the maintenance of overhead line equipment.

Walsall Electricity Committee have accepted tenders by Babcock and Wilcox for boiler house plant at £20,124, and by Belliss and Morcom for turbines, alternators, etc., at £17,448.

Bolton Electricity Committee have provisionally accepted the following tenders:—British Westinghouse Company, two 1,000 kw. and two 600 kw. rotary converters; British Thomson-Houston Company, extra high-tension three-phase switchgear; Johnson and Phillips, high-tension single-phase switchgear.

Leeds Council by a large majority on July 29 accepted the tender of Siemens Bros'. Dynamo Works for the supply and erection of a 23,000 kw. turbo-alternator and condensing plant at Whitehall Road power station, at £34,160, subject to borrowing powers being obtained. The contract involves spending about £11,000 on the construction of the turbines in Zurich.

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Swansea Town Council have accepted tenders by the British Westinghouse Company for main generating station switchgear at £1,377, and by Ferguson, Pailin and Company for sub-station switchgear at £547.

Salford Town Council have accepted the following tenders:—Ferranti, Limited, General Electric Company, Limited, alternating-current meters, £182 14s.; Chamberlain and Hookham, Limited, continuous-current meters, £810 12s.; W. T. Henley's Telegraph Works Company, Limited, rubber strip, £43 10s.; Electrical Engineering and Equipment Company, Limited, and W. T. Glover and Co., Limited, twin and multiple-core cable, £81; concentric cable for working pressure up to 660 volts, £143; ditto, up to 3,300 volts, £30; extra high-tension three-core cable, £1,515; W. T. Glover and Co., Limited, rubber-covered cable for working pressure not exceeding 660 volts, £78; ditto, not exceeding 250 volts, £70; twin flexible cable, £20; rubber-covered cable for working pressure not exceeding 3,300 volts, and ditto for working pressure not exceeding 6,600 volts, at schedule prices; J. G. Brill Company, 48 trucks, £3,262; British Westinghouse Electric and Manufacturing Company, Limited, 12 car electrical equipment sets, £3,048; Dick, Kerr and Co., Limited, 10 car electrical equipment sets, £2,520; 44 controllers, £1,474; Siemens Bros.' Dynamo Works, Limited, two car electrical equipment sets, £441; four controllers, £127; British Westinghouse Electric and Manufacturing Company, Limited, extension of high-tension switchgear and supply of control panels in connection with 5,000 kw. turbo-alternator, £307; Bertram Thomas, three-phase continuous-current switchboard (including £300 for instruments), £1,398; British Westinghouse Electric and Manufacturing Company, Limited, three-phase extra high-pressure switchboard, £914.

PERSONAL.

Mr. Wm. Paterson, formerly chairman of West Hartlepool Tramways Committee, died on July 28.

Mr. A. Sinclair has been appointed charge engineer of Swansea electric lighting and tramways undertaking.

Alderman Robinson, chairman of Bradford Electricity Committee, has been asked to become Lord Mayor of the city.

Mr. E. H. Dixon, of Southampton, has been appointed chief lecturer in the electrical engineering department at Salford Technical Institute.

Mr. Geoffrey Porter, of Edmundsons' Electricity Corporation, has been appointed assistant chief engineer to the British Columbia Electric Railway Company.

Ex-Provost Brownlee, of Dundee, whose death is announced, was largely instrumental in starting the Corporation electric tramways and electricity undertaking.

Mr. H. Richardson, Dundee City electrical engineer, has resigned his commission as a Territorial officer on account of the pressure of his municipal work. Mr. Richardson has been associated with the Volunteer and Territorial forces for eleven years

Messrs. Gillespie and Beales, of Amberley House, Norfolk Street, Strand, have recently been appointed sole selling agents to the Corporations of Great Britain by Messrs. Charles Macintosh and Company, of Manchester, for their solid motor traction tyres. Messrs. Gillespie and Beales ask us to state that they will be pleased to receive inquiries from their friends.

Tramway and Motor-'Bus Men and the War.—We are informed that out of a total of 12,000 employees in the tramways department of the London County Council approximately 700 have been called up to the Reserve. In addition to these there are 100 men in the National Reserve, who have not yet been mobilised. The London General Omnibus Company have had 2,000 men called up from all grades, 50 p.c. being drivers. This is accounted for by the fact that, in addition to the reservists, a large number of the men had engagements as military transport drivers. Neither the tram or 'bus service have been materially affected, despite this large call upon the staffs.

FINANCIAL REPORTS AND MEETINGS.

Oldham, Ashton and Hyde Tramways.—The directors have announced a dividend at the rate of 5 per cent. per annum, less income-tax, on the ordinary shares for the half-year.

Kalgoorlie Electric Tramways.—Presiding at the ordinary general meeting in London on July 30, Mr. A. H. P. Stoneham said that although the receipts were some £3,000 less and wages, after the arbitration award, were £600 more, the net receipts were only £500 less than in the previous year, which he thought the shareholders would consider, under the trying circumstances, very satisfactory. The great trouble they had to deal with was the very unfair competition which the Council had thought proper to permit. As the shareholders knew, they had to pay to the Council 3 per cent. of their gross receipts and they had to keep their track in good order for the whole of their mileage; and the Council had let down their own track to such an extent that the whole of the traffic passed over the track of the company. They had always suffered from that state of affairs, although they had represented to the authorities the unfairness of not maintaining their track. In addition to that, the Council allowed privately-owned motor cars to compete against the tramways. If motor 'buses were at work they would be under the control of the Council and properly licensed, and would be compelled to keep a scheduled time table and charge schedule fares, whereas what he complained of was that miners and others had bought private motor cars for their own pleasure and used them for hire without restriction. They paid no licences,

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no wages, nothing towards the upkeep of the road and no taxes, and on race days and when a theatre company came to Kalgoorlie all these private cars came out and competed against the tramways. They had represented the matter to the Council, but they could get no redress. The company was still making good profits, and people were agitating for them to reduce their fares, to which they were strongly opposed. They were still able to pay their interest on the debenture stock and keep up the sinking fund.

WEEKLY TRAFFIC SUMMARY.

THE BRITISH ELECTRICAL FEDERATION.

The traffic statement for the week ended July 31, 1914, shows that the receipts from tramways and railways amounted to £42,313 as compared with £42,931 in the corresponding week last year, and from omnibuses £17,333, as compared with £11,770, making a total of £59,646, as compared with £54,701. The tramway and railway route mileage was 429.82, as compared with 428.47. Upon such of the services as were working both last year and this year the receipts show a decrease of £488 upon the week.

RAILWAYS OF THE UNITED KINGDOM.

The summary of the official traffic returns of the fifty principal railways of the United Kingdom for the week ended August 2 gives a total of £3,071,293, which was earned on 22,162 miles, being at the rate of £138 11s. 8d. per mile of line open. For the corresponding week of 1913 the receipts of the same lines amounted to £3,125,567 with 22,137 miles open, or £141 3s. 9d. per mile. There was thus a decrease of £54,274 in receipts, an increase of 25 in mileage, and a decrease of £2 12s. 1d. in receipts per mile. Thirty-six of the returns distinguish between the receipts from passenger and goods traffic, and these show a decrease of £20,339 (or £1 0s. 8d. per mile) in the passenger receipts and a decrease of £33,780 (or £1 12s. 5d. per mile) in the receipts from goods traffic. The aggregate receipts of the fifty railways since the beginning of the year amounted to £70,916,196, in comparison with £71,467,610 last year, a decrease of £551,414.

COPPER AND ALUMINIUM MARKET.

August 7, 1914.

Messrs. Henry R. Merton and Co., Ltd., 2, Metal Exchange Buildings, Leadenhall Avenue, E.C., supply the following quotations of prices per ton :—

	Friday, August 7.	Last week.	A Year Ago.
			£ s. d.
Standard Copper (cash)	Metal Exchange closed.	Metal Exchange closed.	68 15 0
,, ,, (three months)			68 15 0
Electrolytic Copper—bars or ingots			71 10 0
Aluminium—bars or ingots			86 10 0

COAL MARKET.

August 7, 1914.

Messrs. Locket and Judkins, of 3, Fenchurch Avenue, E.C., report as follows :—

	Friday, August 7.	Last week.	A Year Ago.	Two Years Ago.
London, free into barge in Thames—	In consequence of war conditions no quotations can be given.	s. d.	s. d.	s. d.
Best Admiralty Welsh (large)		27 6	25 6	22 6
Best Seconds		24 6	24 0	21 9
Ordinary Drys		21 0	21 0	20 0
Best Washed Nuts		20 0	21 0	19 0
Best Washed Peas		19 0	19 6	17 6
Cardiff, f.o.b.—				
Best Admiralty (large)		23 0	21 0	17 6
Best Seconds		20 0	19 6	16 9
Ordinary Drys		16 6	16 6	15 0
Best Washed Nuts		16 0	16 6	14 0
Best Washed Peas		14 6	15 0	12 6
Newcastle, f.o.b.—				
Best Steams		15 3	15 3	14 9
Best Seconds		12 6	13 6	12 9
Smalls		9 0	10 0	9 9

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Anglo-Argentine	Aug. 5	£55,298	£54,377	31	£1,723,230	— £2,851
Auckland..... (28 days)	June 5	20,007	20,919	49	247,311	+ 6,331
Ballarat and Bendigo	June 21	3,178	3,158	12	11,240	+ 93
Brazilian St. Ely. Mirs.	May	44,820	50,287	43	523,872	+ 76,626
Brazilian Traction.....	July 25	95,720	97,183	4	388,200	+ 8,334
Brisbane	June	25,013	28,590	26	168,975	+ 17,972
British Columbia .....$	June	680,693	660,383	52	8,789,287	+ 297,048
Buenos Aires Pt. & City	May	6,925	6,713	22	36,517	+ 3,206
Buenos Aires Lacrose...	July	45,221	43,327	4	43,327	— 1,894
Calcutta.....Rs.	July 25	62,978	70,516	29	20,14,580	+ 114,232
Cape Town	April	12,175	13,408	17	55,388	+ 3,226
Carthagena & Herreria	July	3,794	1,567	30	15,363	— 5,762
Cordoba.....	June	13,416	13,883	13	41,977	+ 1,915
East India	July	1,892	1,966	48	21,030	+ 809
Kalgoorlie.....	June	2,854	2,692	26	15,522	— 1,704
La Plata.....	July	4,770	4,359	30	33,603	— 2,739
Lima.....	May	32,256	33,150	22	173,754	+ 6,825
Lisbon ..... Mirs.	May	...	178,215	...	...	...
Madras (14 days) Rs.	July 31	27,430	29,911	29	407,769	+ 32,682
Manila.....	June	133,500	132,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	857,500	+ 7,000
Mexico .....$	June	588,780	592,468	26	3,530,545	+ 265,005
Montevideo.....	July	29,189	26,417	39	283,663	— 3,939
Para	June	25,373	20,914	30	150,423	— 30,495
Port Elizabeth.....	April	4,357	3,758	17	16,633	+ 245
Puebla .. .. $	June	61,300	62,000	26	380,800	+ 25,900
Rangoon	June	4 807	4,997	26	32,384	+ 982
Shanghai .....$	July 22	23,192	25,400	29	695,740	+ 100,778
Singapore .....$	July 25	12,486	11,520	29	356,905	+ 5,622
Toronto .....$	June	815,206	861,988	26	5,025,926	+ 370,440
Winnipeg.....$	June	321,037	335,012	26	2,091,552	+ 119,178

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	Latest Return. 1914.	Incr. or Dec.	Aggregate. Wks.	Aggregate. 1913-4.	Increase or Dec.
Aberdeen Corporation..	July 29	£1,863	£2,017	+ £154	9	£16,028	+ £1,389
Accrington Corp.....	,, 29	622	574	— 48	17	10,490	+ 465
Ayr Corporation	Aug. 1	595	612	+ 17	11	5,779	+ 276
Bath Electric	July 29	1,172	1,168	— 4	30	29,256	+ 2,162
Birkenhead Corp.	Aug. 2	1,483	1,304	— 139	17½	22,965	— 441
Birmingham Corp.	,, 1	11,415	12,261	+ 846	18	224,752	+ 19,384
Blackburn Corporation	July 29	1,498	1,341	— 157	18	25,085	+ 1,206
Blackpool Corporation	,, 30	3,692	3,339	— 353	18	35,0.7	+ 4,197
Bolton Corporation	Aug. 2	2,840	2,815	— 25	18	51,165	+ 1,791
Bournemouth Corp.....	,, 5	3.528	3 444	— 84	18	41,096	+ 2,339
Bradford Corporation..	,, 1	6 549	6,714	+ 165	18	115,196	+ 7,553
Brighton Corporation..	Aug. 2	1,594	1,457	— 137	17½	20,975	+ 1,487
Bristol	July 31	9,102	10,010	+ 908	30½	259,748	+ 20,392
British Elec. Federatn.	,, 31	54,701	59,646	*	...	...	...
Burnley Corporation ..	Aug. 1	2,487	1,729	— 758	18	30,674	+ 23
Burton-on-Trent Corp.	July 26	288	325	+ 37	17	5,158	+ 350
Bury Corporation.....	Aug. 2	1,450	1,348	— 102	17½	25,172	+ 365
Cardiff Corporation.....	July 18	2,838	3,103	+ 265	15	45.786	+ 2,952
Chatham and District..	,, 30	917	985	+ 68	30	27,645	+ 604
Chesterfield Corp.	,, 23	250	280	+ 30	16	4,628	+ 480
Colne Corporation	Aug. 1	373	300	— 73	...	...	...
Cork Electric.....	July 30	568	516	— 52	30	15,131	+ 295
Croydon Corporation ...	,, 24	1,961	1,798	+ 152	16	30,358	+ 2,338
Darlington Corporation	,, 25	266	298	+ 32	17	4.537	+ 312
Derby Corporation	Aug. 4	1,043	1,040	— 3	17½	18,705	+ 1,046
Dover Corporation	July 25	274	301	+ 27	17	4,262	+ 209
Dublin & Lucan	,, 31	198	175	— 23	4½	773	— 59
Dublin United	,, 31	6,879	6,191	— 688	30	177,896	— 3,343
Dundee City	,, 29	1,441	1,382	— 59	10½	14,883	+ 503
East Ham Corporation	Aug. 1	919	1,098	+ 179	17½	19,341	+ 1,417
Exeter Corporation	July 31	398	406	+ 8	18	6,592	+ 427
Gearless Motor 'Buses.	Aug. 1	610	461	— 149	31	14.501	+ 7,245
Glasgow Corporation ..	,, 1	18,449	18,140	— 309	8	182.742	+ 9,504
Glossop(U.Elec.Supply	,, 1	140	129	— 11	31	3,966	— 101
Halifax Corporation ..	July 28	2,308	2,245	— 63	17	38,998	+ 1,970
Hastings & District.....	,, 22	1.224	1.268	+ 39	29	27,031	+ 572
Huddersfield Corp.	Aug. 1	2,276	2,439	+ 163	18	62,877	+ 5,004
Hull Corporation	,, 1	3,123	3,118	— 5	18	57,017	+ 2,223
Ilford U.D.C.	,, 1	443	565	+ 122	17	9.768	+ 1.339
Ilkeston Corporation ..	,, 5	165	155	— 10	18	2,489	+ 5
Ipswich Corporation ..	,, 1	550	544	— 6	18	8,868	+ 707
Isle of Thanet	,, 1	1,541	1,599	+ 58	44	23,961	+ 1,067
Kilmarnock Corp.	,, 1	267	254	— 13	11	2,058	— 79
Lanarkshire	July 30	1,544	1,537	— 7	30	57,581	+ 7,561
Lancashire United	,, 29	1,705	1,625	— 80	30	49,731	+ 5,091
Leeds City	Aug. 1	8,565	8,672	+ 107	18	154,365	+ 6,740
Leicester Corporation..	,, 1	2,911	2,985	+ 24	31	89,787	+ 4,614
Leith Corporation	,, 1	717	789	+ 72	11	3,956	+ 537
Leyton U.D.C.	July 30	1,372	1,398	+ 26	18	24,720	+ 1,327
Liverpool Corporation..	Aug. 1	13,658	14,048	+ 390	30½	403,352	+ 12,723
Llandudno & Colwyn B.	July 31	683	693	+ 10	35	9,317	+ 10
London County Council	,, 30	41,410	42,235	+ 825	17	759,783	+ 38,992
London Gnl. Omnibus..	Aug. 1	68,575	71,625	+ 3,050	31	1,982,031	+ 64,894
London United	July 31	6,997	6,479	— 518	31	191,085	+ 1,910
Lowestoft Corporation	,, 25	309	359	+ 50	42	8,372	+ 865
Maidstone Corporation	,, 30	226	235	+ 9	18	3,937	+ 266
Manchester Corp.....	Aug. 1	17.546	17,159	— 387	18	320,854	+ 6,981
Met. Elec. Trys.	July 31	9,229	9,159	— 70	31	281,273	+ 6,889
Nat. Steam Car Co., Ld.	,, 31	4,836	6,676	+ 1,840	38½	165.345	+ 65.550
Nelson Corporation.....	Aug. 1	262	245	— 17	17½	3,889	+ 56
N'castle-on-Tyne Corp.	,, 1	4,890	5,318	+ 428	18	95,846	+ 9,435
Newport (Mon.) Corp....	,, 1	831	838	+ 7	18	15,286	+ 1,882
New St. Helens & Dist..	July 29	936	853	— 83	4	3,757	— 218
Northampton Corp.....	,, 31	603	618	+ 15	17½	10.641	+ 368
Nottingham Corp.	,, 30	3,334	3,433	+ 99	17½	61,860	+ 3,401
Oldham Corporation ...	Aug. 2	2,397	2,241	+ 156	19	44,052	+ 2,346
Portsmouth Corp.....	,, 1	2,504	2,925	+ 421	17	42 895	...
Preston Corporation ...	July 29	902	872	— 30	18	16,272	+ 248
Provincial	Aug. 1	2,532	2,520	— 12	48	82,719	+ 4,534
Reading Corporation ...	July 30	727	724	— 3	17	12,810	+ 872
Rhondda.....	,, 23	1,270	1,263	— 7	29	36,106	+ 1,872
Rochdale Corporation	Aug. 1	1,787	1,682	— 105	18	29,594	+ 533
Rotherham Corp.....	,, 5	1,214	1,181	— 33	18	18,779	+ 919
Salford Corporation ...	,, 3	5,657	5,116	— 541	18½	94,830	+ 109
Sheffield Corporation ...	,, 2	7,389	7,541	+ 152	18½	147,479	+ 7,509
Southampton Corp.....	July 27	1,458	1,446	— 12	17	24,175	+ 1,480
Southend-on-Sea Corp.	,, 29	1,251	1,444	+ 193	18	19,358	+ 3,418
South Met. Trys.	,, 31	916	1,092	+ 176	31	33,840	+ 8,574
South Shields Corp.....	Aug. 1	858	881	+ 23	17½	14,458	+ 1,748
Sunderland Corp.....	,, 2	1,845	1,698	— 147	18	27,500	+ 1,424
Sunderland District ..	July 29	602	673	+ 72	39	22,968	+ 1,990
Swindon Corporation ...	,, 29	164	169	+ 5	17	3,064	+ 289
Torquay.....	,, 23	832	768	— 64	29	16,118	+ 585
Trys. (M.E.T.) 'Buses	Aug. 1	8,007	9,356	+ 1,349	31	277,828	+ 184,604
TynesideTrys. & Tmrds	July 29	580	566	— 14	5	2,404	+ 66
Wallasey Corporation	Aug. 1	1,454	1,528	+ 74	17½	24,029	+ 1,743
Walsall Corporation ...	,, 1	638	631	— 7	31	19,805	+ 480
Walthamstow U.D.C....	,, 1	792	812	+ 20	18	15,172	+ 1,817
Warrington Corp.....	July 30	480	483	+ 3	17	6,741	— 85
West Ham Corporation	,, 30	2,668	2,773	+ 105	17	50,363	+ 2,401
Wigan Corporation	,, 30	1,458	1,448	— 5	17	26,272	+ 539
Wolverhampton Corp	Aug. 5	1,378	1,337	— 41	19	30,569	+ 354
Yorkshire (W. Riding)	,, 2	1,559	1,512	— 47	31	45,239	+ 1,218

* From such of the services as were working both last year and this year the receipts show a decrease of £428 upon the week.

ELECTRIC RAILWAY TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	Latest Return. 1914.	Incr. or Dec.	Aggregate. Wks.	Aggregate. 1914.	Increase or Dec.
Central London.....	Aug. 1	£4,142	£4,260	+ £118	31	£138,116	— £2,378
City and South London	,, 1	2,599	2.480	— 119	31	82,708	— 5,348
Liverpool Overhead.....	,, 2	1,840	1,814	— 26	31	53,212	+ 497
London Electric.....	,, 1	11 660	12,120	+ 460	31	432.635	+ 1,900
Mersey	,, 1	2,106	2,115	+ 9	31	69.071	— 329
Metropolitan	,, 2	17.879	18,224	+ 345	31	568,081	+ 42,280
Metropolitan District..	,, 1	12.379	12,542	+ 163	31	406.451	+ 853

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THE Tramway & Railway World
WITH MOTOR TRAFFIC SECTION

FOUNDED 1892. LONDON, AUGUST 13, 1914. VOL. XXXVI.

ELECTRIC TRAMWAYS IN CONSTANTINOPLE.

Since the Young Turks secured the reins of power in Turkey the transformation of Constantinople has proceeded with remarkable rapidity, and the zeal which has been displayed in the endeavour to adapt all public services to Western models is nothing less than marvellous. The introduction of electricity into the various spheres in which formerly its use was rendered practically impossible by the heavy taxes of the old regime, is of far-reaching significance for the future of Constantinople. Now that most of the restrictive regulations have been removed, the lost decades have been overtaken in a few years, and before long electricity will effect for Turkey all those useful services which in the West have long been regarded as its natural function. In a short space of time electric arc lamps will give their customary brilliancy to the hitherto badly-lit streets of the Turkish town of Stamboul and the foreign quarter of Pera. So far, the lighting of houses by gas has been far from general on account of the altogether insufficient installation of the two gas works, and the greater part of the population is dependent upon paraffin.

Of all the advantages of modern industrial progress which will make life more bearable in the capital of Turkey, one at least, the electric tramway, has already been given to the public. The management of this undertaking is in the hands of an Ottoman Company, the "Société des Tramways de Constantinople," and is conducted by Europeans. A part of the shares are held by the "Consortium Constantinople," which is directed by the "Société Financière de Transports et d'Entreprises," of which the Head Office is in Brussels.

Electric Tramway on the New Galata Bridge over the Golden Horn.

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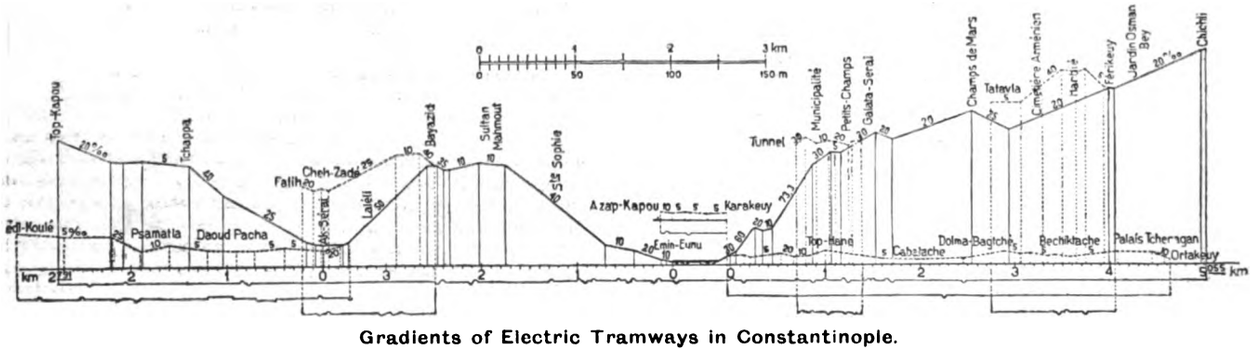
German industry is very largely concerned in the supply of the equipment. Much delay took place in laying down the lines owing to local conditions and political disturbances in the Balkans; but in August, 1913, a section three miles long was opened in Pera, and to-day the cars run between Galata and Stamboul, over the Golden Horn. The manner in which the tramways have been patronised by the public is outstanding proof of the need which exists for such services. As a matter of fact, means of conveyance in Constantinople have always been insufficient, and this was particularly the case last year when the tramways management was forced to suspend the entire service, as all the horses had been commandeered by the military authorities. The resumption of the tramway service was a genuine relief, and, to begin with, the population literally stormed the cars. There is still a very great crush at the Tunnel Place in Pera, where 20,000 passengers, most of whom are going on to Chichly, arrive daily by the tunnel line, a cable line between Galata and Pera.

Map of Constantinople Tramways.

The introduction of electric traction brought with it another change which progressively-minded people welcome with satisfaction, though indeed there are others who view the process only with regret. We refer to the disappearance of much that was ancient and even venerable, which had to be cleared out of the path of the modern vehicle. Hills have been levelled, and depressions filled up; narrow oriental streets have been metamorphosed into wide up-to-date thoroughfares; time-honoured fountains which blocked the way have vanished, in spite of the great favour in which they stood with the heat-stricken populace; even cemeteries, which to the mind of the Turk have always seemed sacred and inviolable, have been obliged to give way to the necessities of the traffic; and nothing, perhaps, better than this fact illustrates the irresistible nature of the impulsive force with which the improvements are carried out. Anyone who knew Constantinople as it was will be amazed at the extent of the expropriations, which may be best observed in the ride from Chichly to Top Capou or Yedicoulé. Up in Chichly nothing has changed, as the main street was wide enough to accommodate the trams. On the other hand, the next section, *i.e.*, the road in front of the Taxim Barracks, has been widened to 99 ft. The line next turns into the Grand Le Rue of Pera, which likewise required widening at various points in order to give the minimum of space necessary; even now it is a narrow, unpleasant way which cannot be compared with the beautiful main streets of Stamboul. The line branches at the Galata Sera, going straight on to the tunnel in one direction, whilst the line on the right passes by the Petits Champs, the principal pleasure resort of Pera, and runs through a cemetery from corner to corner, thereby arriving at the top of the hill leading down to Galata with a gradient of 1 in 13·5 along a stretch of 1,320 ft. Here the line passes through the Rue Voyvoda, which contains the post offices of the various nations, banks, and business houses, and from which many narrow ways lead down to the harbour. One of these side streets going to the Karakeuy Place, which was always dangerously overcrowed, has been considerably widened, and at this point even the bourse and an important warehouse had to be sacrificed to the tramways. The new bridge, from which such a glorious view across the harbour to Asia Minor can be obtained, is now crossed, which brings us to the genuinely Turkish town of Stamboul, rich in ancient monuments which the violence of the elements, fire, and earthquake, and, to a greater extent still, the spirit of modernism tend increasingly to destroy. The route continues by the Valideh Mosque and up through the widened and levelled Hodja-Pascha Street, to the Top-Capou Serai, formerly the residence of the Sultans and separated from the rest of Stamboul by a high wall. Opposite the western angle of the Serai wall is the chief portal, the Sublime Porte, which is protected by a projecting arched roof. A little later one catches sight of the Aja Sophia, the oldest church of Christendom, transformed by the Turks into a mosque after the capture of Constantinople, and then of the Et Meiden, a magnificent open space extending in front of the Aja Sophia and containing the mighty Mosque of Sultan Achmed and other ancient buildings. After this the line turns into the splendid main street of Stamboul, the Divan Yalou, which has entirely preserved its oriental character. Passing by the Mausoleum of Mahmed II. and the Burnt Column erected by Constantine, a wide open space is reached in which the Bayazid Mosque and the Seras Kerat, or War Office, stand. Then through narrow streets, of which the widening is projected, to the site of the Great Fire, picturesque ruins which will very shortly disappear, for plans for the building of wide thoroughfares on the European pattern



Gradients of Electric Tramways in Constantinople.

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have already been prepared. After passing this district the line divides, one branch going to the Top Capou and one to Yedicoulé Capou, two gates in the wall erected in the fifth century during the reign of Theodosius which even now separates the town from the wilderness without.

Although long sections of the electric tramway network were already laid down, only a comparatively small stretch could at first be worked, as the installation at the power-stations for supplying the current was still far from complete, and the power had to be taken from an auxiliary plant set up by the Austrian Siemens-Schuckert Works. The work on the power-stations has since progressed so far that they can supply current for the tramway. The track is of metre gauge throughout, and has been mostly constructed in double lines. The length of the present system is about 18·5 miles, and comprises five sections.

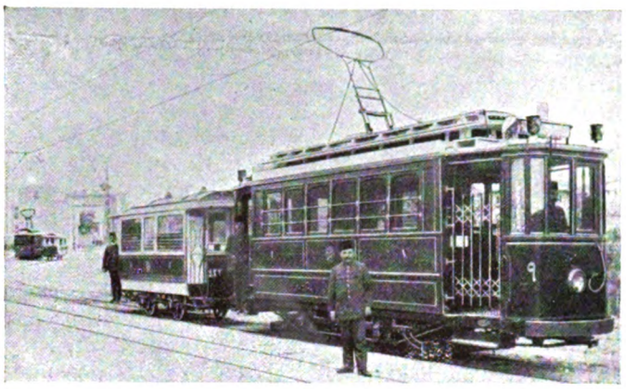
Considerable extensions of the system are planned, and the work has been started in certain cases; thus, the line is to be prolonged beyond Ortakeuy to Bebek, along the Bosphorus, and new sections from Chichly to Kassim Pascha, from Emin Enou along the Golden Horn to Eyûb, the cemetery of the Turks, are under consideration. When the extensions have been completed the total length of the system will be 50 km.

The power-station, which will also supply the current for illuminating purposes in Constantinople, was built by the Societé Ottomane d'Electricité at Siligthar, at the end of the Golden Horn, in the Valley of the Sweet Waters of Europe. The determining factor was the presence of fresh water for the boilers, and the possibility of bringing the coaling vessels right up to the station; there is also the advantage that the supply of energy to the sub-stations on both sides of the Golden Horn can be assured by means of cables laid underground, submarine cables being thus avoided. For the generation of power, three turbo-generators of 6,000 H.P. are provided, which deliver three-phase current of 9,600 volts and 50 periods. For driving the steam turbines there are six boilers with travelling grates which are automatically stoked. The three-phase current delivered by this power-station is transformed in three sub-stations, one of which is in the Bayazid quarter and the two others on the Pera side, in Galata and Taxim respectively, and the transformation into 600-volt continuous current is effected by means of rotary converters of 400 KW. each.

In spite of the narrowness of the streets and the pavements, the overhead wires have been erected in the usual way, standards being employed almost throughout, as the walls of the greater number of the houses were unsuitable for rosettes. In the main streets the standards are of such dimensions as to allow of their carrying electric arc lamps. There is also a frame-like projection on the standards to receive the State and municipal telephone lines. Every standard is capped by a finial with the Turkish crescent.

The rolling stock comprises at present 110 motor cars—40 first-class, and 70 second-class—and about 50 trailers. Fifty more motor cars have already been ordered, and the whole of this business has gone to Germany. The cars have seating for 18 persons on reversible seats, standing room for seven on each of the semi-enclosed platforms, and further standing room for three inside. A portion of the interior is separated by a curtain from the rest of the car and reserved for the Turkish women.

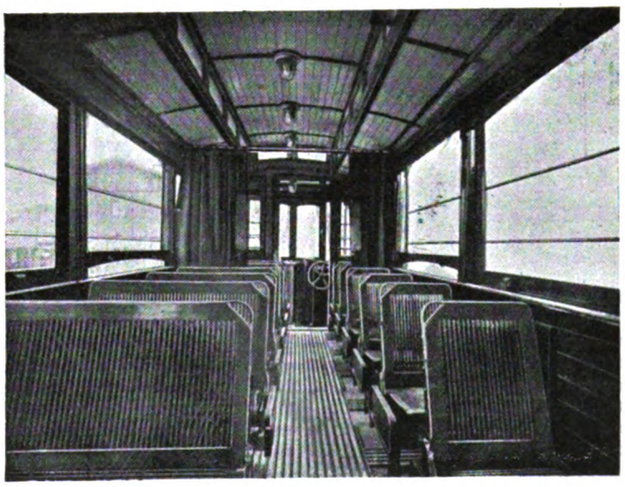
There are curves of 49 ft. 6 in. radius on this system, and the trucks have a wheel base of 7 ft. The electric equipment of the motor cars has for the most part been supplied by the Siemens-Schuckert Works. These cars are each provided with two continuous-current reverse-pole motors of the Siemens-Schuckert Works D 58 W type, with revolutions per minute of 420, and an output of 40 H.P. per hour. On the steep Chichly-Top Capou stretch they drive the car and one trailer at a speed of 7·44 miles per hour. The greatest speed attained by the motor cars on the level is 15·5 miles per hour, and regulation of the motors is effected by a controller of the Siemens-Schuckert O.W. type



Motor and Trail Car—Constantinople.

which has nine power and six brake positions. A spindle brake serves for general use, whilst for emergency purposes electric braking may be effected. To ensure greater safety on the inclines, magnetic rail brakes have been fitted, which can also be actuated by the current from the trolley line. All the cars have electric light throughout, and in the first-class cars, a connection for electric heating is also provided.

The rolling stock is housed at three depots, one of which is in Chichly and the second in Bechiktache;



Interior of Motor Car.

the third, still in course of construction, is at Ak Serai, on the site of the old horse-car shed. In addition to the depot at Chichly, the main workshops, stores, and a residence for the tramway servants have also been built. For this interesting account of progress in Constantinople we are indebted to the courtesy of the "Elektrische Kraftbetriebe und Bahnen" and the Siemens-Schuckert Works. The illustration of the new Galata Bridge is by Messrs. Spooner and Company, of London.

OVERHEAD WIRES FALL AT A JUNCTION.—An accident of a somewhat unusual character occurred at a Plymouth terminus on July 31. A trolley left the wire and fouled other wires which converge from two routes at this point. A transverse suspending wire broke, and the whole network came down, thus stopping the service for some time.

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UNDERGROUND TRAMWAYS FOR LONDON.

ELIMINATION OF DEAD ENDS.

By A. J. Lawson, M.Inst.C.E.

The House of Commons Select Committee on London Traffic, which reported last year, stated:

"A serious cause of congestion within the Inner Ring is the existence of tramway dead ends. Many witnesses have emphasised their inconvenience and danger. *Your Committee can only repeat the comment of the Royal Commission of 1903:*

"'It is difficult to appreciate how such a state of 'things can have been tolerated so long. Whatever 'view may be held upon the expediency of extending 'tramways in London it cannot be expedient to work 'those we have upon inefficient methods.'"

Yet, notwithstanding, the London County Council's Bill in the present session of Parliament has been mutilated because the City Corporation, which in 1871 consented to tramways in Queen Victoria Street, King William Street, Cannon Street, and other thoroughfares, witholds its consent to the construction of two short lengths of tramways essential for the removal of the inconvenience and dangers above referred to.

A glance at the excellent route map published in the monthly time tables of the County Council's tramways department shows the lines terminating in these dead ends, the improvement of some of which the writer now suggests. Many, unfortunately, cannot be improved out of existence; but some by extension could be more suitably placed for the convenience of tramway and railway passengers, while others, by the adoption of loops, can be entirely done away with.

Both classes of these inconvenient termini will be dealt with in their order of location, beginning with—

High Street, Aldgate.—An extension of about 50 yards to the Whitechapel lines, over which cars to and from East Ham and West Ham now run, would bring the tramways up to the Aldgate Station of the Metropolitan Railway (where both sets of tramway rails would run with cross-overs from the incoming to the outgoing lines). A part of the traffic would use the extension, while the other part would pass over a loop of single lines branching off from the High Street down Mansell Street, when widened, to and along Royal Mint Street or Tower Hill, and return along the Minories as a single line to Aldgate Station.

This is one of the improvements vetoed by the City.

Finsbury Pavement.—At present the City Road tramways terminate in Finsbury Pavement at the City boundary, with two cross-overs from the down to the up lines, which add to the congestion, at this point, of the omnibus and other vehicular traffic from Moorgate Street through Finsbury Pavement, and the important goods cartage traffic from the railways *via* South Place and Chiswell Street. In this instance the most convenient solution would be the abandonment of the tramway spur into Finsbury Pavement (about 160 yards only of useful track) and the construction of a single-line loop around Finsbury Square, which is now a business centre, not a residential quarter as in olden times.

Aldersgate Street.—The present tramway terminus here must remain a "dead end" until the street is widened and through communication from north to south is rendered possible by the construction of the authorised St. Paul's Bridge, and the piercing of the east end of St. Paul's Churchyard by a tramway subway, which will as little affect the stability of the Cathedral foundations, as the recent gilding of the cross has added to the weight upon the dome.

Farringdon Street and New Bridge Street.—The extension (again stopped by City veto) of the Farringdon Road lines, which now terminate at the Metropolitan Railway Company's station, through Farringdon Street and New Bridge Street to a junction with the southern tramways at Blackfriars Bridge on a viaduct over Fleet Street, at Ludgate Circus, was recommended by the Royal Commission on London Traffic. Fortunately the recommendation, which was a mistaken one, was never acted upon. It would certainly have added to the disfigurement of this part of the City, begun by the erection of the Ludgate Hill viaduct of the London, Chatham, and Dover Railway, whereby the view of St. Paul's from Fleet Street was wholly spoilt. There apparently is no reason, however, why a cut-and-cover tunnel should not be constructed along Farringdon Street from a point near Stonecutter Street, under Ludgate Circus, the level of which, together with that of the east end of Fleet Street, could be raised three or four feet, thus easing the Ludgate Hill gradient (at the same time removing the hideous obstructive obelisks to Robert Waithman and John Wilkes), and emerge near Tudor Street in new Bridge Street, continuing thence on the present street level to a junction with the Blackfriars Bridge lines. The surface gradients between the tunnel entrances in Farringdon Street and New Bridge Street could also be eased by the filling up to the new Ludgate

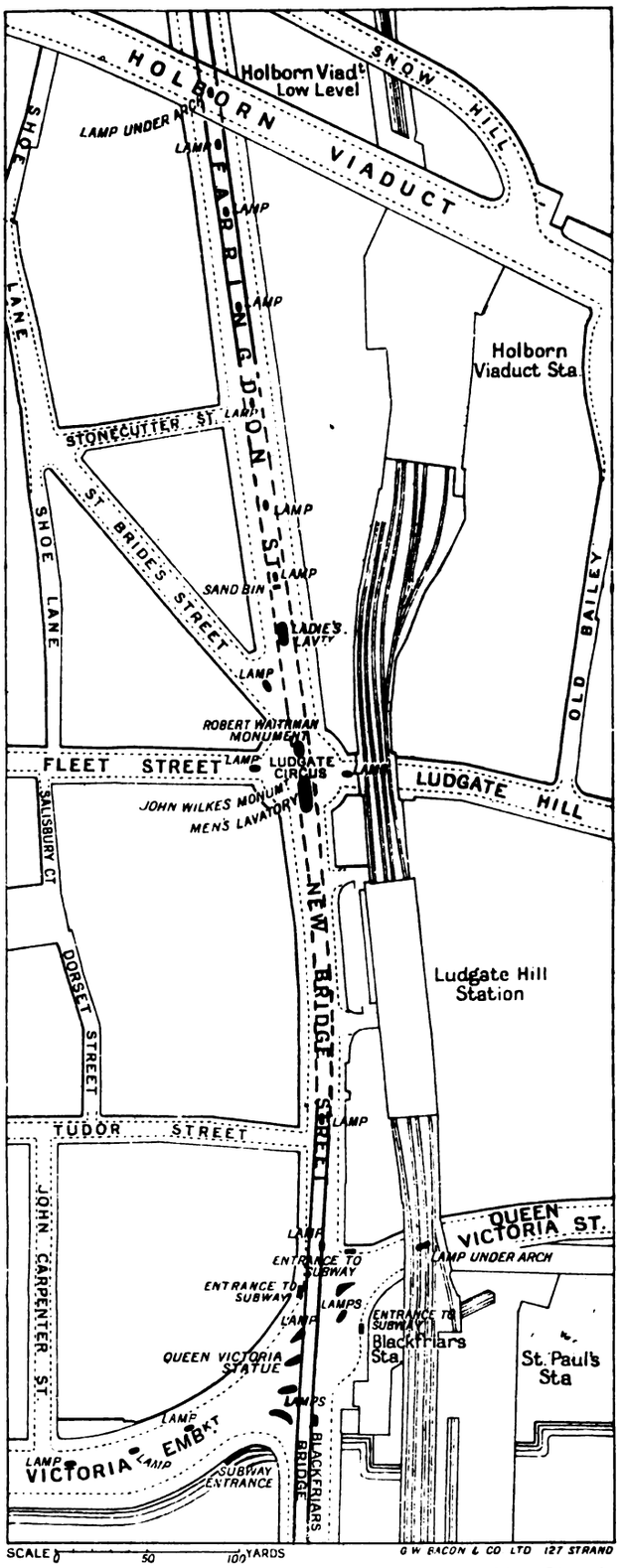

Fig. 1.—Plan of Farringdon Street and New Bridge Street.

Circus level of these two thoroughfares. This improvement is indicated in Fig. 1, the tunnel portion being shown by broken lines in roadway.

Gray's Inn Road.—At the extreme western point of the City's northern boundary the Gray's Inn Road tramways terminate in a dead end near

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Holborn Bars, the removal of which is out of the realm of practical politics.

Tottenham Court Road and Charing Cross.—For years past the extension of the Hampstead Road tramways into and along Tottenham Court Road has been brought annually before the County Council, and as often shelved. Evidence in its support was given before the late Committee on London Traffic by the chief officer of tramways (and for the further extension as far south as the National Gallery), and he apparently urged the construction of surface lines along the whole route, which would involve the crossing of Oxford Street at right angles to and obstruction of the east and west-bound traffic in the latter thoroughfare. Such an obstacle could hardly have been seriously contemplated, but the impression was created that this was another effort to force tramway aggression at the expense of other methods of locomotion. The following scheme, however, would not involve any interference with the Oxford Street route, but, on the contrary, relieve the traffic at the southern end of Tottenham Court Road, and give to east and west-bound traffic of other vehicles a freer roadway.

The Tottenham Court Road tramways would be continued as surface lines to a point at that road's southern end, north of the Horse Shoe Restaurant, whence a shallow tunnel would conduct the lines under Oxford Street, and continue underground in double width to Cambridge Circus—at the junction of Charing Cross Road and Shaftesbury Avenue—at which point the lines would bifurcate into single-line tunnels, the down track being carried along under West Street and St. Martin's Lane to St. Martin's Place, the up line from this point returning *via* Charing Cross Road; both down and up lines being joined by a curve of wide radius under St. Martin's Place, the cars thus changing direction without reversal of the cars themselves. The broken lines on the map (Fig. 2) show the approximate positions of the lines, the arrow heads indicating the direction of running the cars both upon this extension and the southern extension hereinafter mentioned. Stopping places, or underground stations at Cambridge Circus, Garrick Street, St. Martin's Place, and Coventry Street would give all necessary access to the cars by subways communicating direct from the pavements, at suitable points, without in any way incommoding other traffic.

The total route length from Hampstead Road to St. Martin's Place is only 1 mile 1 furlong 3 chains, of which 5 furlongs in Tottenham Court Road would be overground; the length of double tunnel to Cambridge Circus would be 2 furlongs; and the single track tunnels—straight line and loop—would be 5 furlongs 3 chains in length. The tunnels would be of sufficient dimensions to take the standard double-decked cars. The proposed arrangement is shown in Fig. 2.

St. Martin's Place—Victoria Embankment.—A similar double line and single line arrangement of tunnels might afterwards be constructed from the Embankment *via* Villiers Street to the Strand and Concannon Street, Chandos Street, and Adelaide Street, touching the northern lines under St. Martin's Place, thus giving a turning point for the southern cars, and by two side spurs uniting the two loops in such a way as also to provide for the running, at more infrequent intervals, of through cars from north to south London and *vice versa*.

It will be observed that here also there would be no interference by the tramways with other east and west-bound traffic—a consideration which should induce the Road Board substantially to contribute to the cost of construction of the tramway tunnels, even though their traffic would be more than sufficient to yield a big return upon the heavy estimated expenditure of £500,000 per mile.

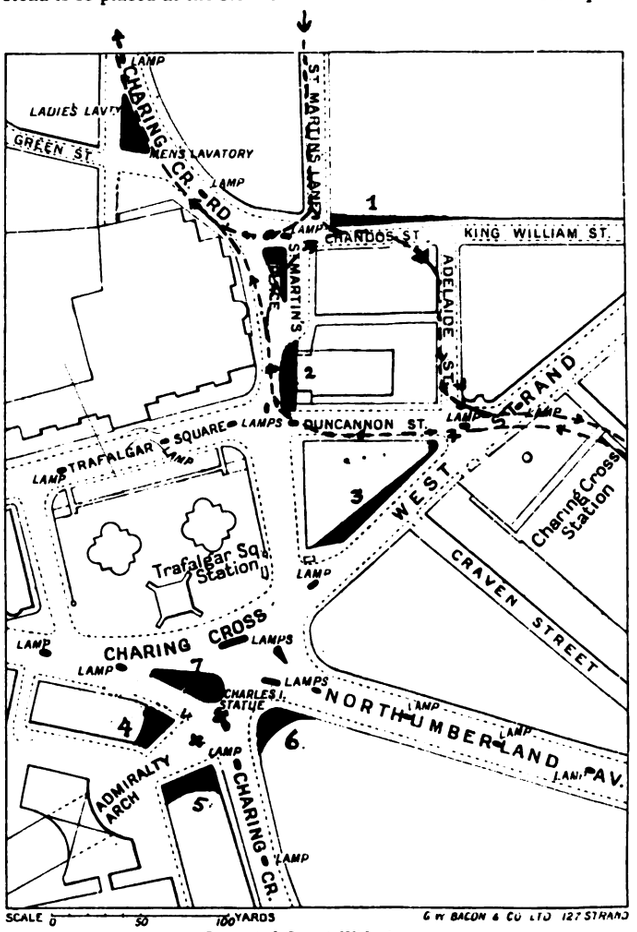
Euston and Marylebone Roads.—Crossing London westwards, the only possible looping up or extension of tramways on the north side of the Thames appears to be a new line from St. Pancras along the Euston and Marylebone Roads, duplicating the facilities afforded by the Metropolitan Railway as far as Edgware Road, and only separated from that line by the crown of the arch of its tunnels, but providing another east and west connection of tramways which would in no way detract from the appearance, or impede other traffic, along these gloomy thoroughfares—if the word thoroughfare can be applied to the latter, which, at its western end, leads nowhere. To remedy this defect it is suggested that Marylebone Road should be diverted by widening Mitcham Street between Cosway and Lisson Streets, and cutting a new road one furlong long through the small properties at the back of the Edgware Road Station of the Metropolitan Railway into Edgware Road, where old buildings still stand awaiting reconstruction. The cost of the improvements would be offset by the betterment of the adjacent properties.

The Marylebone Road would then indeed be a thoroughfare, and the joining up of the proposed tramway with the present Harrow Road tramway, owned by the London County Council but operated by the Metropolitan Electric Tramways Company, whose lines extend far into Middlesex to the west and north, would give through communication of far-reaching benefit to residents along the routes of the company s and Council's lines, and add enormously to the traffic of both undertakings.

The total length of the suggested new tramway would be only 2⅛ route-miles.

Vauxhall Bridge Road.—The present dead end in this road, near Victoria Street, can only be remedied when Wilton Street is widened to the line of new frontage indicated at Parnell's Arcade (where the building line has been thrown back several feet) and a single-line loop be carried through Gillingham Street and along Wilton Street in front of Victoria Station for up traffic, the down traffic to pass round the top of Wilton Street, and return by a single line in Vauxhall Bridge Road as far as Gillingham Street; the present lines from this point outwards being retained. By this means only can the confusion arising from the bunching of some 10 or 12 cars obstructing the whole tramway traffic at times of rush, especially in the evenings, while the positions of the cars in the procession is being remarshalled at the two existing cross-overs—an operation involving the loss of several minutes to each vehicle—be overcome. Meantime, Wilton Road, the widening of which has already commenced at only one place, is reserved for ordinary vehicular traffic, to which in recent times up and down services of two lines of omnibuses, both with light traffic, have been added.

Waterloo Bridge Road.—The present dead end in Waterloo Bridge Road is so placed at the New Cut or Lower Marsh Road as to be quite



1, 2, 3.—Suggested Street Widenings.
4, 5.—Admiralty Arch Widenings.
6.—Future Widening of Charing Cross.
7.—Lavatories to be removed.
† Proposed New Site for King Charles I. Statue.
+ New Street Refuge.

Fig. 2.—Subways from Tottenham Court Road to Victoria Embankment.

out of sight of passengers alighting from South Western or South Eastern trains at Waterloo Station who might desire to continue their journey to any point in south London by tramcar; hence a considerable increase of passengers for the omnibuses passing the station. An extension of the tramways up to York Road would be most useful, and its length would be only one furlong; while its continuation to the southern end of Waterloo Bridge would only amount to a total increase of route length of 2 furlongs 2 chains from the present end.

The whole of the extensions, loops, and junctions above mentioned, including the completion of the inner ends of the tramways, involve the construction of a little over six miles of double-track lines; but, being at the inner or business portions of London, the cost of construction would be proportionately heavy, especially the tunnel sections. Their usefulness would, however, be more than proportionately great in facilitating the more direct transport of passengers to their places of

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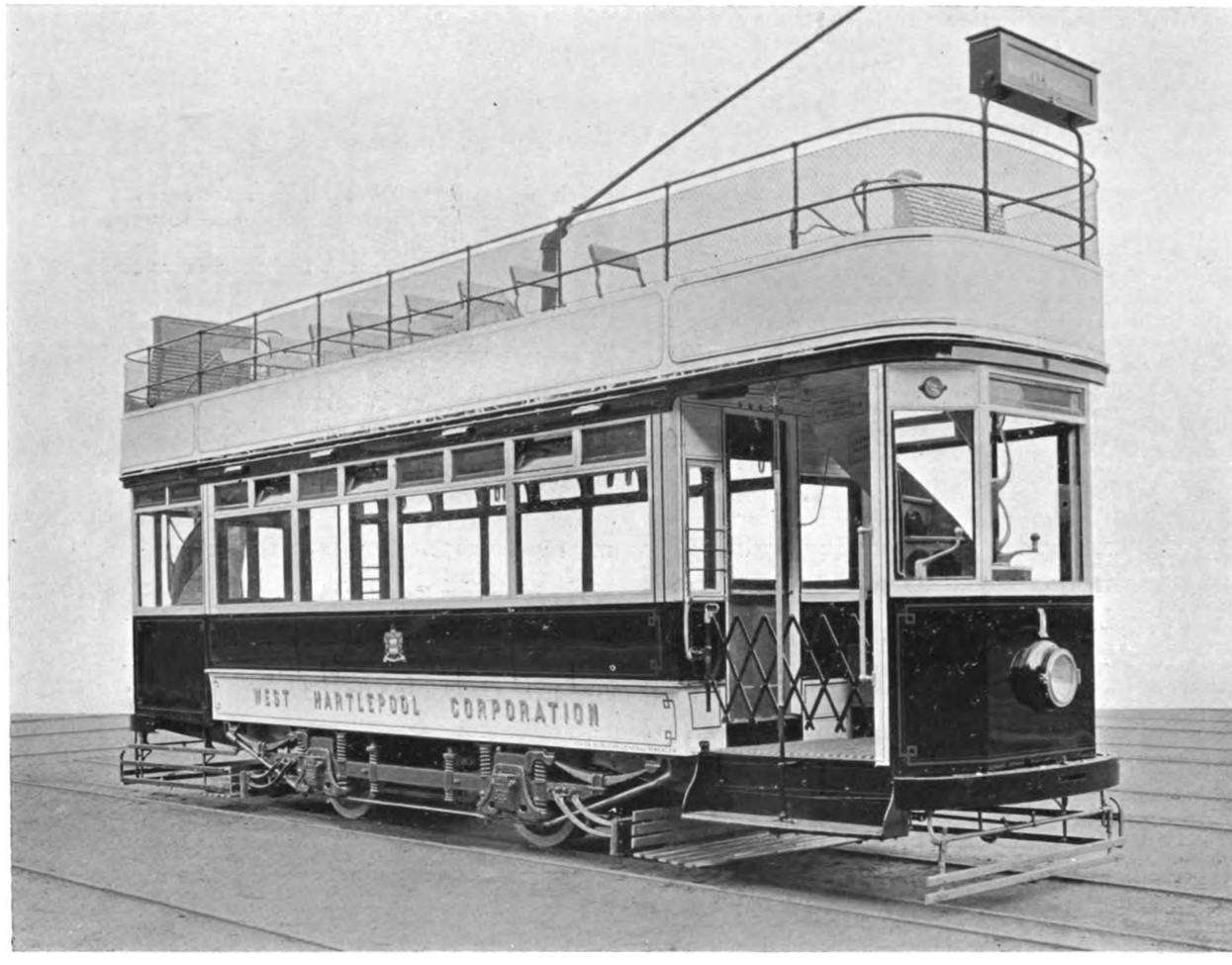
business; and the increase of traffic may very reasonably be placed at 25 per cent. to the numbers at present carried by the existing tramways belonging to the County Council—providing at average fares a more than sufficient return upon the capital outlays involved and completing as they would the only really urgent additions to the actual network; extensions outwards (with possibly the sole exception of the Putney-Battersea link) could be deferred until the carrying capacity of the present system in suburban districts is more fully taxed, or increase of population in any area should render additional means of conveyance necessary or expedient.

Far from being a moribund institution or means of communication doomed to speedy replacement by motor omnibuses or other means of locomotion, the tramways in and around London will require extension from time to time as the population increases and the "riding habit" grows, which at present it appears to be doing at a feverish rate. Since 1906 the total annual number of passengers by railways, tramways, omnibuses, and cabs in Greater London has increased by over 40 per cent., until in the past year it reached the enormous aggregate of about 2,300 millions, of which the various tramways carried over 810 millions, or 34·4 per cent. of the total; and the indications are that in the current year the number of tramway passengers will approach or possibly exceed 830 millions, with the present rate of growth of all passenger traffic in the metropolitan area exceeding 280,000 per day throughout the whole year.

VESTIBULED CARS FOR THE WEST HARTLEPOOL TRAMWAYS.

Another type of vestibuled car has recently been supplied by the United Electric Car Company, Limited, to the West Hartlepool Corporation Tramways. On this car the dashes are square shaped, and the vestibules are built up complete from the platform bearers. The centre light is frameless, and is arranged to drop, being provided with finger holes in the upper portion for raising and lowering. The vestibule side lights are fixed.

In the lower saloon the seats are of the United Electric Car Company's patent "triumph" reversible type, upholstered in rattan. The operating mechanism of these seats is a considerable improvement over that of other existing types, and the seats are being supplied in large numbers, having been specified for several hundred cars for South America.



Vestibuled Car for the West Hartlepool Corporation Tramways.

The car body is mounted on the Preston patent flexible axle truck, and is fitted with the Anger brake adjuster. The destination boxes are the Preston company's well-known type. The lower saloon is fitted with the Preston patent system of ventilation, which distributes fresh air over the interior while vitiated air finds an outlet at the height of the roof.

These trucks are now in use on a number of tramways in this country, including Rawtenstall, Oldham, Blackpool, Leeds, Southampton, Bury, Preston, Birmingham, Nottingham, West Hartlepool, etc.

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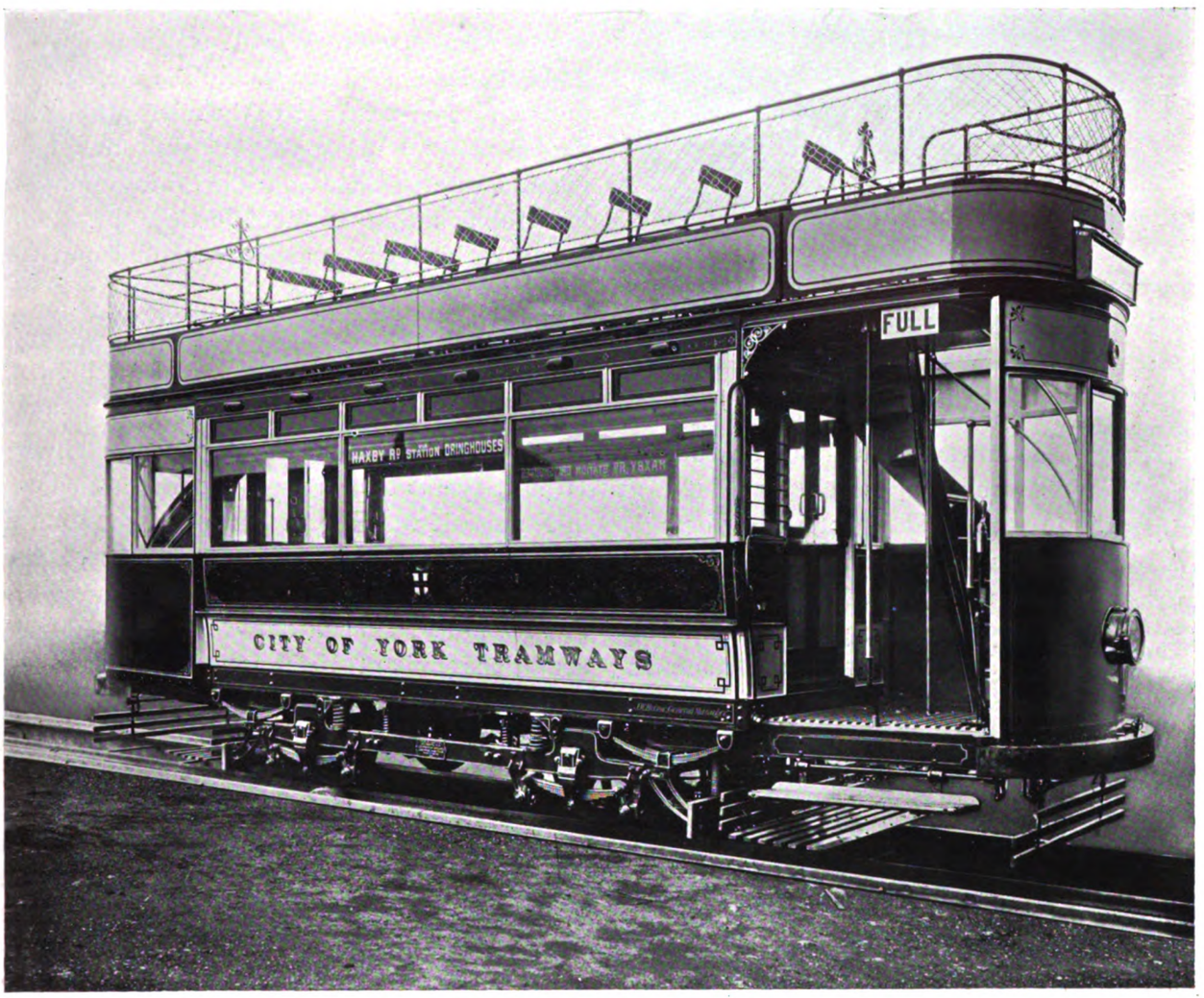
VESTIBULED CARS IN YORK.

The accompanying illustration shows a type of car recently supplied by the Brush Electrical Engineering Company to the Corporation of York. These cars are of the four-wheeled, double-decked, open-top type, with vestibuled platforms. The following are the leading dimensions:

	ft.	in.		ft.	in.
Length over body ..	18	0	Width over pillars ..	6	1
Length over platforms.	27	0	Width over all	6	3
Length over bumpers ..	28	0	Gauge	3	6
Height inside saloon ..	6	7	Wheel base	8	0
Height over all (top of trolley)..	15	4¾	Diameter of wheels ..	0	31¾

The cars were built to the specifications of Mr. J. W. Hame, general manager, York Corporation Tramways. The saloon are amply wide, and are of the twin type. The trucks are of the Brush make, with a wheel base of 8 ft., and the Brush patent motor suspension is used. The wheels have cast-steel centres and steel tires, and the axles are of special grade well hammered steel. Hudson-Bowring life-guards and Cummins sanders are fitted. Each car has seating accommodation for 22 passengers inside and 28 outside.



Vestibule Car for York Tramways.

It will be noted that owing to the presence of the vestibule, and the absence of a roof cover, the car presents a very solid, well-balanced appearance, despite the fact that the gauge is only 3 ft. 6 in. There is no doubt, of course, that apart from mere appearance the vestibuled ends and the absence of the roof cover combine to make the centre of gravity lower than is the case of cars with heavy roof covers and no vestibules. The platform entrance is closed when desired by means of a hinged bar worked in conjunction with the step. When the entrance is closed, the step is folded up. While the extreme width of the car is limited to 6 ft. 3 in., the doors of the

TO LINK HUDDERSFIELD WITH BRADFORD.

A scheme which has for some time been in abeyance has again been brought forward, namely, to construct a tramway from the Huddersfield lines at Ashbrow along the Bradford Road to the terminus of the Halifax tramway system at Brighouse. Huddersfield Corporation further propose to make a line from Brighouse to Rastrick. According to the local press terms are proposed, one of which is that when the Halifax lease expires the Huddersfield Corporation shall be allowed to extend their main lines along Bradford Road, not only to the Brighouse municipal boundary on the north, but to Bailiff Bridge, with the intention of linking the Huddersfield and Bradford systems. Another condition is that if a line be constructed to Rastrick street widenings will have to be made, the cost of which is estimated to be from £3,500 to £4,500, and that Brighouse shall defray the cost. The ratepayers in Rastrick have been asking for better means of communication with the centre of the borough for a long time, and tramways and a series of motor 'buses have both been suggested. Rastrick seems to fear that should the present proposed scheme to Brighouse mature, it will still be left isolated, for members of the Town Council are apprehensive that the finances of the borough will not warrant their going forward with these alterations. Unless some concessions can be made in the direction of sharing the cost the probability is said to be that the suggested Rastrick extension will be abandoned.

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LONDON, AUGUST 13, 1914.

Tramway Conference and Manufacturers.

The annual Congress of the Tramway and Light Railway Association, which was held at Newcastle in the middle of July, brought together a large number of members and guests representing, as usual, every branch of the tramway industry. Municipal and company representatives, consulting engineers, manufacturers, and contractors all meet on a common footing and, whatever may be the case in the formal discussions, in personal intercourse thrash out many contested questions with frankness and good temper. The successful combination of the more or less serious discussion of papers with various social features gives a welcome opportunity for this interchange of opinion between those concerned in different branches of the work; and it is an unquestionable advantage to the industry that there is an association in which membership is possible to all in any way interested in local transport. This explains the vitality which characterises the work of the Association, which should attract an increasing number of adherents. The participation of manufacturers and contractors in the discussions is a feature that should be encouraged. They contribute more than is always admitted to tramway progress. To them is mainly due, in fact, the wonderful efficiency of the modern electric tramway. Although tramway owners and managers occasionally forget the fact, there is in regular use to-day hardly a single device which is not the outcome of much work and expenditure on the part of some manufacturer. These gentlemen often have an uphill fight in focussing attention on their work and convincing managers and engineers of its utility. The latter are generally fully occupied with the routine management of their undertakings, and they have, in many cases, insufficient opportunity to give due consideration to every new suggestion or to exchange opinions and experiences. They should the more readily give ear at conferences to the advocates of new appliances and methods. On the other hand, manufacturers should find the criticism of users invaluable, and, to do them justice, they do not fear hard hitting provided it is candid and fair.

Tramway Experiences Abroad.

The stay-at-home Briton often has but vague ideas as to the conditions obtaining elsewhere than in these "fortunate" isles. The cheery paper read by Mr. H. M. Sayers at the recent Tramway Congress in Newcastle was a breeze from over-sea to those of his hearers without foreign experience, and as a reminder of past troubles and triumphs to those who had carried out work under difficult conditions similar to those prevalent in Brazil and in other sub-tropical regions. The unwearying diplomacy with which the man in authority had to be approached and handled must have reminded some of his hearers of similar experiences in other official-ridden countries; but it is evident that Mr. Sayers had less difficulty in managing one man than tramway promoters have in dealing with local authorities as a body—behind whom unfriendly officials can always take shelter. In comparatively backward countries, like those described in this paper, the labour question is much simpler than it is where unions are highly organised. Not many years ago, even in England, the personal equation of the supervisor was a great factor; the men would do anything for one who treated them like men, and who knew what he was talking about. They would stand almost anything in the shape of fiery language from such an one. This feeling still exists in the army, but it is dying in the

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ranks of labour, where the man in authority is looked upon as the representative and tool of the bloated capitalists who find the poor working man in bread thickly spread with butter; while the men themselves are but as wax in the supple and subtle fingers of their (mis)leaders, who batten and fatten on industrial strife. The labourers in Brazil somewhat resemble the old wandering type of navvy and the Chinese; they will work well till they have accumulated enough to have a good "spree," whether it be in riotous living or a gambling bout. If they do not like the job they are on, or the masters they are under, they shoulder their pack and move on. By seeing to their proper housing, to their commissariat, and by taking an unobtrusive interest in their well-being, it is possible to keep together even the most fidgety fellows—to their own advantage, to the great furtherance of their work, and to an increase in their efficiency and a decrease in the general cost of labour. Mr. Sayers' paper gave an insight into those qualities which have enabled the Britisher and those of his stock to carry out the most difficult undertakings with the most inefficient appliances, whether in men or in materials. The extraordinary amount of personal responsibility borne by those who have to answer for the quality of the work and the safety of the workers is well brought out by Mr. Sayers, as are also the necessity for a liberal forecast of requirements from home, which are apt to be unduly delayed by strikes, by shipwrecks, and by other so-called "acts of God." The feeling of satisfaction when all has been successfully accomplished goes a long way towards making amends for the anxieties and discomforts, both moral and material, that have to be undergone in carrying out such work as Mr. Sayers described with so much quiet kindly humour and unfailing cheerfulness.

The Budapest Tramway Congress: A Fateful Parallel.

It is a trite saying that history repeats itself. This repetition, whenever it does occur, differs generally, however, from previous occurrences in some more or less important particulars. The saying is not by any means of universal application, even in its modified form. The struggle in which the civilised world is now involved will be so much more swift and deadly than any previous war, that for horror and devastation it will be beyond anything that could have happened until the means of mutual destruction had been developed to their present extent. These results can only be compared to those of a wide-spread plague or pestilence which paralyses industry, and the consequences of which take many years to obliterate, if, indeed, they ever are effaced entirely. Amongst comparatively minor events with which the present outbreak of hostilities has interfered is the biennial Congress of the International Tramways Union. It was to have been held this month at Budapest, and has of necessity been put off indefinitely at the last moment. As recorded in the issue of this journal for September, 1892, the International Tramways Union, by a singular coincidence, had fixed upon Budapest as the place of the biennial Congress of that year. Then, as now, the Congress had, of necessity, to be put off at the last moment owing to an outbreak of cholera. Then, as now, we were staunch supporters of this admirable association of tramway men, and this support we have consistently given to the Union during the whole interval of 22 years. The Budapest Conference of 1892 was postponed at the time for 12 months. In the present year it would not be safe to postpone it to any definite date, for it passes the wit of man to foretell when and how peace will once more reign, not only in Austria, but in many other parts of the world.

The War and Public Confidence.

Elsewhere in this issue we refer to the effect of the calamity of the European war in depleting working staffs. Here we would emphasise the necessity for everyone concerned keeping a cool head and a quiet courage, and faithfully carrying out his duties towards the public. We believe that those connected with local transport undertakings will show the good steadfast British spirit. Mr. Bonar Law in the House of Commons on August 6 put the point well when he said that the development of industry is just as much an operation of war as the conduct of our armed forces. Admirable measures have been taken by the Government for financial stability, for the protection of food supplies, and for the minimising of unemployment, and the country has already shown that there will be no panic.

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LIABILITY FOR ROAD MAINTENANCE.

A Review of the Situation.

We have now come to a period in the important question as to contributions by the owners of heavy motor vehicles to the cost of maintaining road surfaces. That period was marked on July 20, when the House of Lords gave a third reading to the Middlesex County County Council (Western Road and Improvements) Bill, and refused to entertain a proposal by Lord Montagu of Beaulieu to omit from the bill the special clause which imposes a charge of three-eighths of a penny per omnibus-mile run on the owners of motor omnibuses using the new road which is to be constructed from Chiswick to Hounslow. The bill has now received the Royal assent, and is law. Never before has there been an opportunity to impose a charge of the sort on an omnibus company, and it is significant that Parliament has taken advantage of this first opportunity. A brief general survey of the situation may now be made.

When the pleasure motor car began to come into use some years ago, the local road authorities had to spend large sums in adapting the roads to withstand the wear. By and by they got some relief from the proceeds of the motor car and petrol duties, but, as is well known, the money goes not to ordinary maintenance but to reconstruction and radical improvement.

Matters became much worse with the advent of the motor lorry and the motor omnibus. These heavy vehicles have made havoc of roads which were never intended to stand such traffic. The cost to the ratepayers has gone up immensely. Another form of road traction, the trackless trolley system, has also contributed in certain districts to road wear.

It is now three or four years since applications began to be made to Parliament for power to work trackless trolley vehicles. Parliamentary Committees were for a time puzzled to know how exactly to deal with this new apparition, but practice has now settled down. Parliamentary powers are needed by promoters in the first case, but extensions may afterwards be authorised by the Board of Trade. It was in connection with bills to authorise the use of the railless trolley system that the first attempts were made to get from promoters a contribution towards the cost of road maintenance. Such attempts could only be made where the promoters were companies, or where, if municipalities, the routes extended beyond the municipal boundaries, so that adjacent local authorities could claim. Parliamentary Committees, faced by a new situation, hesitated, but at length the principle was established that the promoters of trackless trolley schemes should pay to the road authorities either three-eighths of a penny per mile run or a sum to be fixed, after experience, by arbitration. Quite a number of bills including this condition have been passed.

Next arose the question of the motor omnibus contributing to road maintenance. A company, of course, does not require to get Parliamentary powers to run omnibuses, so that the question of omnibus companies contributing to road maintenance never came before Parliament until the Middlesex western road case. But local authorities, of course, cannot run omnibuses without getting statutory authority. When, a few years ago, they began to apply for such powers, the request was generally confined to working the vehicles within their own areas. As in that case the omnibus-operating and the road-maintaining authority is one and the same, the question of contributions did not arise. Soon, however, some municipalities promoted bills to enable them to run omnibuses on routes parts of which were outside the boroughs. At once the county councils or other adjacent local authorities put in their claims that the owners of the omnibuses should pay their quota to the maintenance of the roads on which the vehicles ran. Parliamentary Committees were at first exceedingly dubious about this, and in several cases the Committees refused to impose the obligation. Some two years ago, however, it will be remembered, the step was taken, and since then several municipalities have been ordained to contribute to the maintenance of county roads. If we include both the trackless trolley system and motor omnibuses, something like a score of Acts (including those of the 1914 session) have now been passed imposing a charge for road maintenance on the owners of these vehicles.

The case remains of the traction engine and the heavy motor lorry. No means except general legislation seems to be possible for dealing with them. In the same way, only general legislation can deal with omnibuses worked by companies, and with heavy motor vans owned by wholesale and retail shopkeepers. The last-mentioned case is one which entails peculiar hardship on the small shopkeeper in the country town.

A distinct aspect of the subject is presented by the metropolitan area, where the road authorities have been involved in enormous cost for strengthening the streets to withstand the motor omnibuses, and where the tramway authorities not only suffer from the competition, but have to spend greatly increased sums for maintaining the tramway area of the streets. The whole subject, in fact, bristles with anomalies and injustice.

In considering what further steps should be taken, it must be said that the question is complicated and difficult. First, there is, or perhaps it is more correct now to say there has been, the question of principle—whether we are to return to something analogous to the toll-bar system by imposing charges on certain classes of traffic for using the roads. Opinion generally seems to be more and more inclined to answer this question in the affirmative. But before general legislation is attempted it will be necessary to see how the proposed new Treasury grants to local authorities will work out so far as money for road repair is concerned. This factor will have to be taken into view by the Joint Committee of both Houses of Parliament, which the Government are appointing to inquire whether the owners of omnibuses and trackless trolley cars should universally have to contribute. Then the Government have also promised an inquiry by a Technical Committee in regard to weight of traction engines, breadth of wheel tires, and so forth. It will only be after these bodies have reported that any attempt will be made by the Government to pass general legislation.

It has been urged in some quarters that if a charge for road maintenance is put on omnibuses, it will be necessary to increase the fares. But any kind of public service vehicle must justify its existence commercially if it is to endure. If the omnibus cannot exist at present fares without being subsidised out of the road rates, then the fares must be raised. The increase would, however, be so small in the case of the individual as to be hardly noticeable.

The burden on the omnibus, if a charge of, say, three-eighths of a penny per mile run were generally imposed, would still be far less than the existing burden on the tramcar. Petrol tax and licences in the case of the omnibus come to about £50 per omnibus per annum. Allowing for days off for repair and during slack times, it may be taken that an omnibus will run 30,000 miles per annum. On this, three-eighths of a penny per mile would amount to about £45. The two imposts put together are thus roughly £100 per omnibus per annum. The charges on the tramcar for road maintenance and rates on the track are usually very much in excess of this figure.

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Tramways and Light Railways Association.

Full Report of the Sixth Annual Congress, held at Newcastle-on-Tyne, July 16 & 17, 1914.

On Thursday and Friday, July 16 and 17, the Sixth Annual Congress of the Tramways and Light Railways Association was held at the Connaught Hall, Blackett Street, Newcastle-on-Tyne. At the opening meeting Mr. Stephen Sellon, M.Inst C.E., occupied the chair in the absence of the chairman of the Council, the Hon. Arthur Stanley, M.P. Among the members, delegates, and visitors attending the Conference were:

C. A. Ady.
R. Ainsworth.
A. Albrecht.
Ald. G. J. Allen, J.P.
J. G. Ames.
A. Anderson.
R. H. Aspinall.
B. G. Battson.
Coun. W. Beckett.
C. Bickersteth.
A. A. Blackburn.
Fred. Bland.
J. Bowring.
F. H. Briggs.
B. Broadhurst.
J. A. Brodie.
F. Burfoot.
C. Burnet.
W. S. Burton.
John Cameron.
A. H. Campbell.
J. Cater.
G. W. Chalmers.
Major A. J. Clarke.
E. Coote
Ald. Collinge.
H. P. Conibear.
R. W. T. Corbett.
F. Coutts.
A. Coveney.
R. W. Cramp.
F. Crookes Harris.
F. Crosby Jones.
E. Darnell.
W. T. Dawson.
H. S. Day.
A. de Turckheim.
Stanley Dudman.
J. W. Dugdale.
John Eades, jun.
T. P. Easton.
E. H. Edwardes.
Sir J. B. Ellis.
W. F. Endean.
H. England.
H. Everall.
Ald. J. S. Finnegan.
D. Fisher.
Ald. J. Fitzgerald.
E. H. Fleming.
C. W. Francis.
W. E. Freir.
T. E. Gatehouse.
O. T. Gibb.
T. B. Goodyer.
W. L. Green.
C. R. Greene.
R. R. Greene.
R. Hammond.
C. W. Hall.
E. Hatton.
D. Hays.
Lord Headley.
Coun. W. R. Heatley.
Frank Hewer.
C. W. Hill.
E. L. Hill.
W. T. Hill.
H. R. Hogg.
F. H. Holford.
G. W. Holford.
J. S. Huddleston.
R. W. Hughman.
R. Humphries.
Jos. Hunter.
J. G. Hunter.
E. S. Hurlbath.
A. Imeson.
A. H. Jackson.
C. J. Jewell.
Leonard Johnston.
Judge Atherley Jones, K.C.
Dr. H. Kerr.
Wm. Kirkham.
H. W. Laing.
F. H. Lamb.
E. H. Lean.
Coun. W. Lee.
Ald. H. Linsley.
J. C. Little.
F. Lydall.
W. L. Lorkin.
Coun. J. McCaughey, J.P.
G. McClelland.
C. W. Mallins.
H. Martin, J.P.
F. H. Masters.
Coun. Thos. Matthewson.
H. F. Maynard.
Coun. R. Mayne, J.P.
Coun. R. H. Millican.
Wm. Morrison.
Ald. H. Morton.
J. Moxon.
E. A. Nash.
A. Norton.
W. R. Nowell.
A. M. Oliver.
P. F. O'Sullivan.
S. E. Osborn.
J. A. Panton.
E. Peckham.
W. B. Pickering.
G. J. Polglase.
Coun. John Proctor.
T. Rawson Pusting.
F. C. Raphael.
J. H. Robinson.
W. T. Robson.
Ald. J. H. Rodgers.
J. W. Rook.
C. P. Sandberg.
F. E. Saunders.
H. M. Sayers.
K. A. Scott-Moncrieff.
S. Sellon.
Sheriff H. Shaw.
Under-Sheriff C. S. Shortt.
C. W. Shepherd.
J. How Shepherd.
C. S. Shirreff Hilton.
R. T. Simcock.
Rob. Simpson.
E. W. Sleight.
F. Smillie.
Ald. F. Smith.
W. Alderson Smith.
W. H. Smith.
Ald. R. A. Smithson.
G. J. Somerville.
J. Spence.
H. A. Stagg.
C. D. Stanley.
W. J. Steele.
W. A. Stevens.
Coun. R. S. Stewart.
R. Stutz.
Coun. T. Taylor.
C. G. Tegetmeier.
W. Thom.
A. W. Thomas.
P. J. S. Tiddeman.
J. P. Tierney.
A. Toms.
J. Toulmin.
H. E. Townell.
W. H. Turner.
Wm. Vaux.
C. R. Walker.
Johnstone Wallace (Lord Mayor of Newcastle).
Coun. J. Wallwork.
A. H. Walton.
R. R. Wedderburn.
A. G. Whyte.
A. M. Willcox.
Stanley Wilson.
Dr. J. B. Wright.

WELCOME BY THE LORD MAYOR.

The Lord Mayor of Newcastle-on-Tyne (Councillor Johnstone Wallace, J.P.), who was attended by mace and sword bearers, in welcoming the Conference, said:

I am sure I am voicing the feelings of you all when I say how deeply we regret the enforced absence of your President, the Rt. Hon. Viscount Chilston, and particularly because it is due to such a very sad cause. Lord Chilston's daughter died very suddenly a few days ago, and the shock of the bereavement has naturally weighed heavily upon his lordship. We miss him and are sorry he is not with us to-day, and I think we shall agree to express to Lord Chilston our sympathy, condolence, and deep sense of regret at his sad domestic bereavement, and that will be conveyed to him during to-day's proceedings. It is now my pleasing privilege to offer you, on behalf of the Corporation of Newcastle-on-Tyne and the inhabitants of this city, a very cordial welcome, and I do so with a very great deal of pleasure. Sometimes we are told on occasions when visits of this kind are paid to provincial cities that a visit is then being paid to "The Mecca of Municipalisation." Various towns claim to be the Mecca of Municipalisation; but Newcastle does not, for here we have never been keen in regard to municipalisation. In fact, the only service which has been municipalised in Newcastle is the tramway service. The Corporation has neither the water, the gas, nor the electric light undertakings. Some people might say "shame" to that in a gathering of enthusiastic municipalisers; there is no fear of that being said in a well organised body like this conference. But with regard to the municipalisation of the tramway service, we have had a very narrow escape, because a large section of the Council, true, a minority, but still a considerable section were in favour of leasing. That was not carried, and the Corporation have taken the whole thing into their own hands and have carried it through. But there was another narrow escape—we very nearly became a cable tramway system, which would have been a disaster; but that day is past, and I suppose no city now would ever dream of laying down the cable system of tramways. We have been fortunate in Newcastle with our one ewe municipal lamb. This was partly because the gentleman who was then responsible for the conduct of the affair was Mr. Alderman Cail, just the man required for laying down a tramway system. After he retired from office we had my friend Sir Joseph Baxter Ellis as chairman of the Highways Committee of the Corporation, who was just the man to continue the system, and when he got tired of the work we installed in the committee chair Alderman Rodgers, whose work on behalf of tramways you all know so well. They were proud in Newcastle of being able to say that their tramways had been very successful and satisfactory. They had embarked £1,250,000; they had paid off since the beginning £428,000 as sinking fund—not a small sum to have paid off—and they had £100,000 in a reserve fund; so I think you will be able to agree with me that we have not done so badly, and when you see the distance we carry people for a penny—and we have some half-penny fares too, and many other advantages are given in Newcastle—I think you will give us credit for good management. I am sorry now that you have come to us we have not been able to provide better weather. Newcastle-on-Tyne does not look its best on a dull day. Let us hope the weather will moderate and that we shall have some sunshine for our garden party this afternoon, when I hope to have the pleasure of seeing you all again and also to-morrow. Newcastle is always glad to welcome visitors and does its best to make them feel at home, and I hope that when you go away you will carry with you pleasant recollections and memories of this ancient city of Newcastle-on-Tyne, to which I now give you a very cordial welcome. (Cheers.)

The Chairman: My Lord Mayor,—It is with much pleasure that I rise to thank you warmly for the very kind way in which you have welcomed this Association to the city of Newcastle-on-Tyne. I am sure, judging from the programme which has been drawn up for our pleasure and instruction, we shall have the greatest enjoyment from our visit here, and that we shall be able to store up in our memories recollections of one of the most profitable and pleasant conferences which we have ever held. On behalf of all the members of the Tramways and Light Railways Association, the delegates and the visitors, I beg to tender to you, my Lord Mayor, our most grateful thanks. (Applause.)

Alderman J. H. Rodgers, having made various announcements as to the day's arrangements, the Chairman delivered a brief address.

THE CHAIRMAN'S ADDRESS.

Mr. Stephen Sellon, M.Inst C.E., who then took the chair, said: Owing to the unavoidable absence of the chairman and vice-chairman of the Council, the duty devolves upon me to open these proceedings at short notice, and I therefore hope you will forgive any imperfections on my part. We deeply regret the absence of our

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president, the Right Hon. Viscount Chilston. You all know the cause, which is a very sad one, and it has been suggested—I am sure you will be glad to associate yourselves with that suggestion—that a telegram should be sent to him somewhat in the following terms: "All here assembled at the Tramways and Light Railways Congress offer to their president sincere sympathy in his sad bereavement, and express their great regret at his absence." As you are all agreed, I will request the secretary to send that message. We regret the absence till to-morrow of our chairman, the Hon. Arthur Stanley, M.P., and our vice-chairman, Mr. Harry England. We also have to deplore the removal by death of the Duke of Argyle, our late president. It was only fitting that at the first opportunity this Association, when it meets, should remember its obligations to the late Duke for the very great assistance he rendered to this Association in its early days. His Grace did a great deal in assisting to bring it up to its present prosperous position, and I think we here ought to acknowledge the very deep debt of gratitude which we owe to him in the past. The Council of the Association sent a suitable letter of condolence to H.R.H. Princess Louise, Duchess of Argyle, and we had a gracious reply thereto. We desire to place on record our grateful thanks for the cordial reception which we have received from the Lord Mayor of Newcastle. The programme which has been prepared is before you, and no doubt we shall take full advantage of the arrangements made for our pleasure and profit. In connection with that, it is necessary that we should remember that we are also deeply indebted to Mr. Alderman Rodgers—(hear, hear)—the chairman of the Newcastle Tramways Committee, who has co-operated so heartily in assisting us to achieve the objects of our visit—that of securing the advantages which the members of the Association obtain by these gatherings. Mr. Rodgers is one of those gentlemen who has the courage of his opinions; we admire him for that, and for the way he tells us when a municipal authority is not doing the proper thing with its accounts. When that happens he tells them so too. (Laughter.) If only others had similar pluck, we should not hear quite so much about money which has been hardly earned by the Tramways Committees being used to relieve the ratepayers to the detriment of the reserve fund. In addition to Mr. Rodgers, we have the pleasure of recording our thanks to Councillor R. Mayne, J.P., the vice-chairman of the Newcastle Tramways Committee, who in his paper is going to tell us some of the secrets of Newcastle, and the reason of its tramway success. I trust he will be discreet. (Laughter.) We further have to acknowledge with thanks the hearty co-operation of Mr. Ernest Hatton, the general manager of the Newcastle tramways system, whom we all know. (Cheers.) We recollect the time when he came to Newcastle, and we know the great things he has done since he has been in this city. We include in these sentiments of gratitude the northern tramway companies, and I am very glad to be in the position to thank them on behalf of the Association for the entertaining programme they have kindly put forward for us, and I have the greatest pleasure in coupling with that sentiment my old friend Mr. Shirreff Hilton, who always gives us of the best whenever he has the opportunity. We have to thank Mr. Greene and all the associated northern companies for their kind co-operation in this Congress. I also wish to couple with this expression of thanks the name of the Tyneside Company and Mr. J. C. Little, who will entertain us to-morrow. Gentlemen, one who is dear to all tramway men, one who has assisted largely to make tramway history, is now celebrating his jubilee of 50 years' association with tramway work, I refer to Mr. Andrew Nance, a gentleman whom we all know, whom we all respect, and I am sure you will heartily endorse the suggestion that the following congratulatory telegram should be sent to him on behalf of this Congress: "Andrew Nance, general manager, Belfast Tramways, Belfast,—The members of the Tramways and Light Railways Association, assembled at the annual Congress at Newcastle-on-Tyne, tender you hearty congratulations on your jubilee, and offer you all their good wishes, regretting you cannot be with us." I know you will sanction that telegram being sent to Mr. Nance. (Cheers.) We heartily welcome here Alderman H. Linsley, the president of the Municipal Tramways Association, and Mr. George Holford. We are pleased to see them at our Congress, and trust that their visit will be as great a pleasure to them as their presence will be to us. (Hear, hear.)

The whole question of contribution to the repair of roads is, as you are aware, about to be dealt with by a Departmental Committee. This Association considers that the present burdens of road maintenance imposed upon tramway undertakers is very harsh and very unreasonable. (Hear, hear.) Mixed up with this is the question of a proper contribution of the motor omnibus towards road repairs, and also the grave question of our continually increasing cost of maintenance of roads due to the extraordinary traffic which is now introduced upon them. I therefore desire that the secretary should read to you a letter which has been sent by the Council of this Association to Mr. Herbert Samuel, the President of the Local Government Board, and it will show you, though I do not think that is necessary, that your Council is not losing this opportunity to protect all your interests.

The Secretary (Mr. A. de Turckheim) then read the following letter:

30th June, 1914.

To the Right Hon. Herbert Samuel,
President of the Local Government Board,
Whitehall, S.W.

Sir,—I am instructed by my Council to express the hope that representatives from this Association may be afforded an opportunity of stating the case of the tramways before the Departmental Committee, which they understand is now being set up to consider the question of road maintenance.

The Association is anxious to lay all the facts before the Departmental Committee, more especially those relating to the upkeep of tramways permanent way.

Under a statute passed more than 40 years ago tramways are compelled to keep in repair and to maintain their own tracks and 18 inches on either side of the rails, which means in the case of double lines the greater part of the whole street.

Under present-day conditions, when these tracks are subjected to a serious increase of road traffic, accompanied by a great increase in tare weight (heavy motor traffic, motor lorries, and so forth), disastrous burdens are placed on tramway undertakers, who obtain no relief whatever under these new and onerous conditions.

In the case of some of the smaller undertakings this is such a serious matter as to imperil their very existence, and the more important ones are finding it increasingly difficult to maintain their undertakings in a satisfactory condition.

My Council would very greatly appreciate anything you might be willing to do to assist the Association in this matter, which is of the utmost importance to all concerned.

I am, sir,
Your obedient servant,
(*Signed*) A. de Turckheim,
Secretary.

The Chairman then called on Mr. Councillor Mayne, who read the following paper:

SOME FEATURES OF THE NEWCASTLE CORPORATION TRAMWAYS.

By Councillor Richard Mayne, J.P.
(Vice-Chairman, Newcastle-on-Tyne Corporation Tramways Committee).

Some features of the Newcastle Corporation Tramways have greatly improved the features of the city. The installation of the system rejuvenated its venerable face, opened out its arteries, cleared away wrinkles, made smooth the rough places, added vigour to its business and pleasure to its social amenities. The principal streets, prior to that time laid with cobles, were paved with wood; streets were widened; obtrusive corners were removed; not entirely at the cost of the system, but the capital cost of the tramways was debited to the extent of at least £150,000 towards these street improvements.

Prior to the year 1900 a service of horse trams, over about 17 miles of single track, was worked by Messrs. Turton and Busby, and they ran approximately 840,000 car-miles per annum, as against the present system of 62 miles of single track and nearly 5,000,000 car-miles per annum. The Corporation themselves laid down the lines for the horse trams, and leased them to the company at 7 to 7¼ per cent. on their capital outlay as rental. The money was borrowed on a 30 years' loan, the lease to the company being for 21 years. At the expiration of the 21 years, although all the money received from the company by way of rent had been paid towards interest and redemption of the loan, there remained a debt of over £30,000 unextinguished, which was accounted for by the fact of a lease of 21 years having been granted on a 30 years' loan. That debt is being paid off by the Tramways Committee at the rate of about £1,500 per annum, and the city rates are relieved to that extent, as this could not fairly be charged to the capital cost of the new system.

Whilst the undertaking of a tramways service by the municipality puts upon the Council first and foremost the onus of public service, yet every development should be such as will yield to its shareholders, the ratepayers, a profit on their investment. For every penny spent by its customers, the best pennyworth obtainable anywhere should be supplied—for its employees the best wages and conditions obtaining in any similar employ—but over and above this, the best profits possible. These profits may take the form of cash, but it would be equally "making a profit" if otherwise inaccessible districts were opened out and house building encouraged in areas less congested than in the city's oldest streets, built in a period when travelling on foot was not only a labour, but a loss of time, inconveniences which could not be avoided for want of facilities. The profit would then be obtained in a greater rateable value and in healthier conditions.

The conditions of a tramway service in any one town can rarely be taken as a pattern for moulding the conditions of another. Geographical

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formation, density of population to the acreage, the varying ideas of what are termed "facilities" held by different temperaments. In the minds of most residents in a locality, low fares seem to be the one and only desiderata, but in Newcastle the guiding rule has been to give ready access to the trams. The result is that there is scarcely a resident of the "canny toon" who is not within five minutes of a tram-car. Parallel lines extend from the Central Railway Station in every direction, so that to walk across from one line to another rarely takes five minutes. This, of course, means a much greater capital cost, and while for the purposes of Newcastle, with its population of 300,000, 62 miles of single track have been laid at a cost of £1,256,052, in the town of Hull half that mileage has been laid to serve a similar population. The difference of cost makes a difference of fares possible and proper, but the advantage obtained in taking every citizen nearer to his home is to be set against that difference in fares. That the facilities provided are appreciated is evidenced by the fact that the population of Newcastle is carried 204 times over in the course of the year. Undoubtedly at certain times our cars are overcrowded, but we are doing our best to overcome this by adding new cars as quickly as possible. In the past year we have built 12, and we have 15 on order.

On the question of our duty to make profits, I cannot claim the support of all my colleagues on the City Council. On the appearance of profits in our annual returns, there are those who advocate their division among the users—or passengers—by giving so much more to them in the way of longer rides for their money, or reduced fares on present distances rather than contribute a lump sum from each year's profits to the relief of the rates. Personally, I find it difficult to view the matter from their point. They appear to me to have the power to see through obstructions and around corners, and I cannot obliterate from my vision the credit of the city or the citizens which has been pledged in the undertaking, and it would most certainly, had failure been the lot of the Corporation undertaking, have been the ratepayers who would have been called upon to pay up. (No increase in the fares would have made a losing system become a paying one.) The natural corollary is that if the system has become a profit-bearing concern these profits are the property of the ratepayers. Probably one-third of the users of our cars are not citizens, and have nothing at stake in the city.

The chief concern of the Newcastle Tramways Committee has been the financial soundness of the undertaking, and the first application of annual surplus moneys has been to the reserve and renewals fund, which has been built up to and is now kept at £100,000, and if the present policy is maintained will always be kept at that figure, payments only being made in relief of rates after replenishing this fund to the extent of withdrawals made for necessary renewals. In the year 1913, £21,000 was paid into the renewals fund and £12,000 to the city fund, and for the current year we estimate a similar amount being placed to renewals and £18,000 to the city fund. All our routes do not pay in the sense of contributing to this cash contribution, rather are they subsidised, to the detriment of the cash profit, but to the advantage of the ratepayers in the particular districts, and doubtless to the eventual cash profit of the city.

I have spoken of the spreading out of the lines as one feature of Newcastle. Another feature is the carrying at low fares of great masses of workmen. Every morning we run about 100 special cars, and a man may travel one and three-quarter miles for a halfpenny; four and a quarter miles for one penny, and six miles for three halfpence. Payment on the car is not taken for a less fare than one penny, and workmen may travel on any car starting on its journey before seven a.m., and in the evening on any car labelled "Workmen's Car," but, beyond this, books of coupons are issued and with these a man may travel on *any* car up to 8 a.m., and on *any* car in the evening between 4-30 and 7-15, and to enable him to get home to his dinner on *any* car in the middle of the day from 12 to 2 o'clock. Our great factories lie near the river at the extreme eastern and western boundaries of the city, and at five o'clock at night, just when so many wage earners other than the artisan or legal "workman" are wanting to be carried, we lift 12,000 at the special fares. The "workmen's cars" are crowded, but it is only this crowding, or overcrowding maybe, which makes financially possible the low fares charged. While the average takings per car-mile on these cars show a sum sufficient to cover the average cost, I am afraid that would not be so if the cost of the plant, etc., necessary to meet the peak load caused by this traffic were charged directly to it.

Whilst this provision for workmen is undoubtedly a boon to those who are privileged to claim it, there are many quite as much entitled to consideration to whom we cannot give it. Any further advance in the direction of these cheap fares at the peak period would involve capital expenditure in generating plant and new cars, which would mean a direct loss to the system. I know that it is difficult to increase fares, but had greater foresight been shown when workmen's special fares were instituted, it would have appeared more just to have kept them a little higher, and to have extended a modified advantage to many wage earners—clerks, shopmen, warehousemen, women, and girls—with small wages. These now have to pay full fare, while others who may be and are earning up to four or five pounds per week, travel at the very low rates. We need a "levelling day," bringing up and bringing down—an all-round return ticket at a fare and a half would be the best solution.

Members of my committee fear there would be an outcry from those who might have to pay a little more, but if the north country artisan could realise the position, his sense of fairness is such that while he might not like it he would appreciate its justice.

Another feature of the Newcastle Corporation Tramways, which I should like to bring before this Conference, is that of the receipts gained by the carriage of exceptional parcels. At the Dublin Conference of the Association in 1910, the visitors from Newcastle were much interested in the elaborate system established there for dealing with the conveyance of parcels by tram.

At the time we were being greatly exercised by the extent to which the platforms of our cars were being utilised for the carriage of tradesmen's merchandise, and the surprising ideas people held as to what might reasonably be taken on a car. I myself have seen a passenger deposit a large washing-tub (poss-tub we call it) and travel with it a mile and three-quarters—man and tub, for one penny. The conductor suggested that he would probably bring the wringing machine next trip. Fruit and fish and poultry merchants would have a load put on the car by a man near the markets, send a boy with it at a half-price fare to some point where another man would be waiting to receive it.

We did not adopt the idea of several tramway concerns and set up an elaborate system of parcel carrying, but we did say that if any passengers brought parcels too big to carry in the arms or rest on the knees without inconvenience to the next passenger the conductor was to have the parcel left on the platform and make a charge of one penny for it. The result has been that we have added to our receipts £1,800 to £2,000 per annum without any additional outlay, and I think that is as good a net profit as most of the tramway concerns obtain with an elaborate system of parcel carrying and delivery, involving the care and risks of special offices, staff, and equipment.

About three years ago the committee realised that on the outward journey on most of our routes the cars began to unload in the last three-quarter mile, and after a census was taken as to the number of penny fares paid in that part of the journey, a system of halfpenny fares for the last half mile was instituted. That proved very successful, and later the same privilege was granted on the incoming journey. The result has been that on the last half-mile of our principal routes our takings have been quadrupled. The same success has not attended the extension of the halfpenny fare on the inward and outward journeys to the city terminus at the central railway station. This afforded a halfpenny fare from point to point in the centre of the city, but the loss of penny fares has never been made up by a sufficient increase in the number of halfpenny fares.

Such are some of the features of the Newcastle Corporation Tramways, and in submitting to you these items I am conscious that to the technical and practical tramway men before me the points raised may be lacking in savour. They may not have the piquancy of *hors d'œuvre*, but they will be easily assimilated, and, I trust, leave the Conference in good form to digest the heavier food prepared for it. I esteem the compliment given to me as a Newcastle man to open the serious business of the Newcastle Conference, and I hope I have not too far presumed on that compliment by unduly taking up valuable time.

The CHAIRMAN: I am sure we are all much indebted to Councillor Mayne for his very interesting paper. It will form a fitting addition to our journal, and can be studied in the future with profit. He says that probably his paper has been lacking in savour. If it has been lacking in savour it has not been lacking in interest, and I am sure there ought to be a useful and interesting discussion upon it. Before discussing it, I suggest that we accord a hearty vote of thanks to Councillor Mayne for the trouble he has taken in its preparation, and for reading it to the Congress. (Applause.)

THE DISCUSSION.

Mr. ROBERT HAMMOND (London): When I came into this room I had no idea why the chairman was a little late in arriving this morning, but I see now that he was occupied in thinking over whom he could make a victim to open the discussion. Although his invitation is most unexpected, it gives me very great pleasure to accept it. You do not often hear of a Londoner coming to the north of England in his youth. Most youths of Newcastle and neighbourhood go south and make their fortunes in London. Well, I reversed the operations, especially the latter. (Laughter.) I was one of those who was tempted at an early period of life to come to Newcastle quayside, and therefore, that being a good many years ago, it gives me great pleasure to-day to be present at this Congress, and to note the difference between Newcastle of to-day and the Newcastle of 40 years ago. (Hear, hear.) The first thing I did when I got here last night was to walk out and see whether the place looked as it used to. I saw electric tramcars, which did not exist then, and of course I got on one and went out to the Moor, which also did not look as it used to look then. I found it had been converted into a park, to the extent of an avenue on each side, where there used only to be open

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moor. My personal pleasure at the improvements which have taken place in Newcastle, however, is enhanced by the opportunity of listening to this particularly sound paper. I have in the course of my career, as many of you know, stood up for municipalisation, which has not always been specially popular among tramway men, and therefore it is a great gratification to me personally to find the control of the tramways in Newcastle in the hands of two such sound men as Alderman Rodgers and Councillor Mayne—three I should say, for I must not forget the general manager, Mr. Hatton. The two former are the men who have to dispose of the profits which Mr. Hatton makes; and, according to this paper, they have very sound notions of what to do with these profits. No profit is deemed to be divisible profit until they have sustained their reserve fund at £100,000. That is extremely sound. I hope that Councillor Mayne, if he can spare two or three minutes to reply, will give us one little piece of information regarding the basis upon which they pay off the loans. Of course, one cannot attempt to criticise the exact results unless one knows what are the first charges upon the gross profits. I take it from the fact of their being so sound with the £100,000 that there are divisible profits, if I may so call them, and that they are not arrived at until they have made the most ample provision for sinking fund, interest, of course without doubt, and upkeep. The only other observation I should like to make is how heartily we must all agree with the sound views put forward by Councillor Mayne on the question of workmen's fares. No business is sound, whether undertaken by a municipality or whether undertaken by a public company, which sells a large portion of its products at a loss, and those undertakings in the country which are bent on doing that are being conducted on unsound lines. The councillor is right in saying that cheap workmen's fares for long distances absolutely involve a loss, because, as Mr. Mayne so well points out, a peak is created, interest and redemption have to be paid upon the requisite extra cars with which these fares are not burdened, and, therefore, they are really charged below cost price. If the cheapest fares had been made a little higher, the Newcastle Corporation would have been enabled to extend the privilege of cheaper fares to a much larger class, and I do not see why one class should be singled out for favouritism, one might almost say for charity. I do hope the Tramways Committee will show its boldness by taking a step towards giving other hard workers of Newcastle some little benefit. (Applause.)

The CHAIRMAN then called upon Mr. Shepherd.

Mr. C. W. SHEPHERD (general manager, Edinburgh Corporation Tramways): I am sure we are indebted to Mr. Mayne for his paper on the tramways of Newcastle. What struck me about it was this. We have seen and heard a great deal of the good results achieved by the Glasgow tramways with regard to halfpenny fares, and I was wondering as to why those halfpenny shares, if they are such a paying quantity, have not been extended in Newcastle. Perhaps, being a Scotch manager, I can give the Conference some solution as to why Glasgow's halfpenny fares pay so well. I fail to see in a place like Glasgow why, with whatever fare they adopted, they could not make them pay. As you all know, Glasgow, like many other Scottish cities, has a very short mileage compared with the population, and therefore owing to the tenement dwellings, their carrying capacity is perhaps double, according to the area, than it is in out-spread districts like those in the towns of England, whose authorities are trying to give facilities to the working classes to go outside the city to live. Now, Glasgow and the Town Council have lately been making a great fuss about the success of their halfpenny fares, but we in Edinburgh have not adopted them, and do not intend to adopt them. Neither do we intend as a company to carry workmen at a loss. We try to give a universal fare for every person who patronises the tramways, and I believe, seeing that we have got only 25 route-miles, and that our half-year just finished shows gross earnings of £155,000, I think that speaks volumes for the tramways in Edinburgh, and, in my opinion, is a tramway record. I was also equally struck by Mr. Mayne's allusion to the parcel-carrying experiment. What I would like tramways managers to take into consideration is the other part of the carrying capacity of the tramways service, that can be utilised without any detriment to the present carrying capacity for passengers, without any inconvenience to the passengers or obstruction to the other part of the business, and that is the means of delivering small parcels by the aid of messengers. You now utilise your cars for the purpose of carrying bulky parcels; why not add to that by sending out messengers with half a dozen light parcels, which I can assure you is very remunerative? We earned from parcel business in Edinburgh a gross revenue of £6,000, half of which is profit. The carrying out of the work is quite simple, and I am quite sure Newcastle might with advantage to its tramway system take that point into consideration. I will not make any other comments, though I think there are several parts of the paper open to a great deal of discussion.

Mr. G. W. HOLFORD (general manager, Salford Corporation Tramways): I think my first duty is, on behalf of the Municipal Tramways Association, to thank the Council of the Tramways and Light Railways Association for their very kind invitation to us to send representatives to this Conference. The Executive Committee have appointed Alderman Linsley, the president of the Association, who is my chairman, and myself to attend, and I am sure it affords us very great pleasure to be here. We may be said to have a little personal interest in the Newcastle tramway system, inasmuch as your present general manager was for several years manager of our system in Salford. Therefore, we have naturally followed the success of your tramways with very great interest. I am delighted to know from this paper how really successful they are. We see you now have a reserve fund of £100,000, which is, I am sure, a very satisfactory feature. I hope that you may come to be even more successful in the future. There are several things in the paper which I am very pleased to note, for instance, the attempt to "level up" fares. That is a principle we are gradually trying to adopt on our own system, and I think we may achieve something in this direction in the course of the next few years. We are also introducing the system of charging for parcels carried on the cars other than personal luggage, and I am very glad to see that in Newcastle you get £2,000 a year from that source. We in Salford only anticipated about £1,000, but we shall, of course, be very pleased if it is more.

Mr. C. W. MALLINS (general manager, Liverpool Corporation Tramways): I am sure we are all very much indebted to Councillor Mayne for his very able paper. For a paper from a municipal man, it is written with a great amount of courage. It does require courage to go as far as Mr. Mayne has gone, and we cannot be too grateful for his excellent address. Personally, I agree with every word of it. Councillor Mayne referred practically to the question of halfpenny fares, a question which my friend Mr. Shepherd has also just dealt with. Now, I have always been at a loss to understand what is the basis of a halfpenny fare as a commercial proposition. I could never understand it, because first of all you have to stop a 10-ton car, or a 12-ton car if you like, to pick up the halfpenny passenger, then carry him a short distance and stop again to set him down. I do not know, Mr. Chairman, whether that can be done for a halfpenny, I never could see that it could be done and still earn a profit on the operation. I am afraid it is a bad commercial proposition which attempts to maintain a commercial reputation at the expense of the other fares, and it is therefore a kind of parasite.

Mr. H. R. HOGG: Councillor Mayne has spoken from the point of view of those systems which have a very large number of people congregated within a small area. Now, it seems to me that tramways can roughly be divided into two classes, viz., those which have to deal with a large population with no very large comparative mileage, and those tramways which, lying in the areas surrounding those more crowded parts have to deal with a smaller and more scattered population. Here the cost of mileage run is considerably greater in proportion to the receipts than in those places where the system is all in one nucleus. Now if we take these situations of which I am now speaking, the districts outside the large centres of population in a proportionately small area, it will be found that it has been very difficult indeed to run tramway systems as a successful pecuniary proposition. Most of the companies owning that type of tramways have had to raise money in various ways, without the same facilities available in the towns; they have had their debenture holders and they have had their shareholders, and while many of them have been able to pay their debenture interest fairly well, very few of them have been able to do much for their large body of shareholders. It has not been the fault of the management, but we certainly began on a basis which was too cheap for that class of traffic. When tramways were first started we went on the proposition that all fares could roughly be assimilated, but that has not proved, I venture to say, to be the case with systems running outside the centres of dense population. Therefore, it has been a very difficult matter to keep them going, and I am hardly sanguine of those systems being able in the future to be made paying propositions for all concerned for all the money that has been put into them. As Councillor Mayne very properly said, you cannot make your tramway proposition a more paying one by raising your fares. If you raise your fares the people object to it, you create a bad feeling in your neighbourhood, and you cannot get them to ride with the same easy access as they did before. Therefore, fare raising is not a practicable possibility. I think that one of the great problems that we have to look forward to solving in these outlying districts is that of how these systems can be encouraged and kept up. They are most useful from a public point of view, and I think everyone will admit that the safe and speedy carrying of a large number of people between the great centres of population is a most important work, and one which cannot be accomplished so well by railways as it can by tramway systems. The first tramway system of which I had any experience was an extremely successful one, but it began on the basis of having 3d. fares. That was in Melbourne, and the 3d. fares were not objected to by anybody at all. In England we had to begin with fares at 1d. for similar distances to those on which we carried passengers for 3d., and when you begin on a fare like that, and you cannot raise it, then the shareholders all have to suffer. Whether it will ever pay the local municipal bodies to take them up I do not know. I think that it may be possible in the future, at the end of our 40 years' leases or sooner, but it is one of those great problems which I will leave to the many gentlemen here

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who are far more competent to go into the details and solve that question than I am. But it is a question which sooner or later will have to be considered by all who are interested in the subject of tramways.

Alderman F. SMITH (chairman of Liverpool Tramways Committee): It is not at all easy to speak upon a paper that meets with general acceptance, but I do think that in an audience like this we do sometimes find men with the courage of their convictions, and who would be prepared to stand up and challenge the views expressed by Councillor Mayne, when he says that municipal tramways are making a profit under proper conditions. I agree absolutely with the Councillor when he says in his paper (which almost entirely meets my views) that it is the duty of the governing body of municipal tramways to pay to the ratepayers, who are their shareholders, a reasonable dividend for the risk they run. I cannot agree with Mr. Shepherd that it is the duty of municipal tramways to carry parcels. That is not our job. What we have to do is to carry the people, and let them carry their own parcels. (Laughter.) We want to charge a reasonable fare, and in Liverpool we charge a fare that anybody earning 4d. per hour can take advantage of, and at our penny fare cannot afford to walk. We are doing it quite cheap enough without any question of workmen's fares, or any of those finnicking outside arrangements that are intended only for class benefit or to catch votes. (Applause.) I look with a little envy upon the ability of our respected friends here, and their courage to charge for parcels at all. I would like to charge in Liverpool; we could make something worth having there, but Liverpool men are not afraid to carry a parcel, I can assure you. The other day on one of our tramcars I saw, and mentioned to the guard, the fact that there was a parcel about 7 ft. long, and 3 or 4 ft. in circumference. I thought it was rather a big order to take that parcel and the man three miles or so for a penny. In Liverpool we aim to give a downright good service to meet the wants of the people; to give a fair chance to anyone who requires to live outside, and to get to our parks; and to do anything they may reasonably want to do, so long as they are prepared to pay a reasonable sum. But we are not prepared, I am glad to say, to give free fares to the blind, half fares to school children, halfpenny fares at various points, and not at all points (because I think that everybody is entitled to a halfpenny fare for a reasonable distance if you are to have halfpenny fares at all), and all the other catch-votes sort of points raised from time to time. So far we have successfully resisted them, and we are going to resist them as long as we can, because in order to be just to all you cannot be generous to a particular class. When I read the paper sentiments, say, for instance, of Leicester, what do I find? The chairman at Leicester says in his paper read at the Municipal Tramways Conference, that they carry the blind free; they carry the cripples free. Then I look closely at another sentence in his paper, because I do myself the justice of reading a paper when a gentleman takes the trouble to prepare it. I find that they carry about 90 odd blind people, and they carry a limited number of cripples, and I want to know what about the other blind people, and what about the other cripples. Why, if you carry those people free, should you not carry free a variety of other people who are just as much entitled to consideration, as the paper recognised? Why should you carry a man earning £5 a week at a lower fare than a young lady who goes to work at 8s., or 10s., or 12s. a week, and who has to pay more because she travels slightly later in the day. It does not seem just to me. I want to see the right, square, and fair thing every time. Provide for your undertaking first, because that is the foundation of all, provide for the men who work the undertaking second, and third for the people you carry, because they will see to it that you give them all that they can get. I am very much obliged to Councillor Mayne for his paper, he having found the courage to state what so far no one has had the courage to dispute. (Applause.)

Mr. F. E. SAUNDERS (Messrs. Balfour, Beatty, and Company): I am in agreement with Councillor Mayne's opinion as to cheap fares, and consider this constant granting of concessions in cheap fares fatal to any small system. For an example, I can give you the town of Maidstone, a system I managed some few years ago. This undertaking started with a very promising outlook, but the introduction of season tickets and the extending of the travelling hours for workmen, together with extra overlapping stages, changed this outlook and resulted in loss to the undertaking. These cheap workmen's fares, as Councillor Mayne states, create a large peak in traffic and involve large capital expenditure in both generating plant and cars; and if these charges were made direct to this class of traffic it would not prove remunerative. I consider season tickets should not be issued. Concessions to workmen, which unfortunately are compulsory, should only be given in the form of weekly tickets covering a return journey each day. This ensures regular traffic and saves extra rush in wet weather.

Alderman J. H. RODGERS (chairman, Newcastle Corporation Tramways Committee): As a Newcastle man I did not want to come into this discussion at all, but one or two questions have been asked which perhaps I can best clear up. I am very pleased to see Mr. Hammond back again, and to hear what he has said about Newcastle, where his name is very well known. I was very pleased to listen to what he said about the improvement he had found in the city as compared with what it was 40 years ago. Mr. Hammond asked how we dealt with our finances. I presume he refers to the terms of the repayment of our loans. Our loans are equated; that is, if we have a loan for cars, say for 15 years, we pay it back in 15 equal instalments spread over the 15 years' term for which the loan is granted. On the track, if it is for 30 years, which is generally the time, we pay that off by 30 equal instalments, and, therefore, our charge from the beginning to the end is an equal amount so far as redemption of our capital is concerned. Our first capital investment amounted to £1,175,000: of that sum we have paid off up to now £488,000, so that we have taken a very good slice off our original capital in the 12 years we have been running. We charge against our revenue all equipment, sinking fund on loans, interest on loans, all upkeep and management expenses, and we consider our reserve fund, which we maintain at £100,000, is for track renewals and for track renewals only. All other renewals, rebuilding cars, and so on, we look upon as a charge upon our revenue year by year. The reason we look upon it in that way is that the most we can spend on renewing in any one year is estimated at about £25,000, therefore we keep four years' renewals in hand, and what we spend each year we make up again and so keep the reserve fund at £100,000; if we spend this year £15,000 out of our reserve fund we make that £15,000 a first charge before any profits are divisible at all. Thus we keep our finances in a very healthy condition. That was a point we had to fight very hard for—the retention of our reserve fund. I know that in some towns the reserve fund has been commandeered from the Tramways Committee, but here, I am glad to say, our Council accepted the principle that the committee should keep that £100,000 as the backbone of the undertaking.

Mr. R. HAMMOND: I presume your loans are roughly for the period of the lives of the various portions?

Alderman RODGERS: As granted by Parliament, exactly; 15 years for cars, 20 years for machinery, and 30 years for track. With reference to Glasgow, we have often heard it suggested that Glasgow did this and Glasgow did that, but so far as halfpenny fares are concerned it very largely is a question of the geographical formation of a town. Thus in Glasgow, if you want to get to your next door neighbour you have to negotiate two angles almost and you have to take two cars. If you take the number of passengers carried, with your larger population, say over 1,000,000, you seem to carry that population six or seven times a week, almost once a day, but it is not so really, for it is the people who travel four, five, six, or eight times, or even a dozen times, because they have to

Mr. C. W. SHEPHERD: Do not mistake my inference about the halfpenny fares. I was only illustrating what Glasgow did owing to the geographical position of the town, and how they did it.

Alderman RODGERS: No, you are a common-sense man. I am now talking through this Conference to my constituents. (Laughter and applause.) I say what can be done in Glasgow it is absolutely impossible to do in other towns. You might just as well say that a man with an income of £500 a year can live at the same rate and in the same style as a man with an income of £10,000 a year. Our population is only 300,000, including surrounding areas; we have any amount of cheek, and call ourselves the metropolis of the north, but we are a very small body, although we are the centre of a very large population. We have not, like Liverpool and Glasgow and several other places, put our hands on our neighbours' goods. We have allowed our neighbours to work off their little ventures on their own account; we have simply encouraged them to grow round us. However, I am pleased to see you all here, pleased at the discussion that has taken place on this paper. I think it is useful to hear various criticisms of each other's systems, and to note the varying ideas thrown out; and that is one of the practical advantages of these Conferences. (Applause.)

The CHAIRMAN: Before calling on Councillor Mayne to reply, there is just one word I should like to say as regards the remarks of Mr. Rodgers, and that is that he has made a virtue out of a necessity; I suggest that if Newcastle could have gone a little bit outside they would have done so. (Laughter.)

Councillor MAYNE: I just want to express my thanks for the kindly words which have been said about my paper. I endeavoured to take a frank, common-sense view of the matter, and I think a frank common-sense view of any matter will meet with acceptance. Mr. Mallins suggested that halfpenny fares were simply parasites on the penny and other fares. I am quite in sympathy with him, and I think we partly put his principle into practice. As I explained in my paper, the tramcar does not stop to pick up halfpenny passengers on outlying districts; the cars are stopped to set somebody down within the last half or three-quarters of a mile; at every stage somebody is dropped off, and nobody gets on. There is at any rate something better than that with the halfpenny fare, for instead of passengers only getting off, they are getting on. We have quadrupled our takings in that direction. I know there is a difficulty and a danger in doing this, because the public cannot see why it should not be done in other places.

Mr. H. M. SAYERS then read a paper on "Tramway experiences in Brazil."

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TRAMWAY EXPERIENCES IN BRAZIL.

By H. M. Sayers, M.I.E.E.

Tramway construction and operation in the United Kingdom is so straightly conditioned by statutory and official bonds, that openings for diversity of practice and experience are rather limited. It may, therefore, be of interest to recount a recent experience under widely different conditions, racial, climatic, and political, in Brazil.

Brazil is a federal republic, with a written constitution partly modelled on that of the United States, granting very considerable powers of local self-government to each of the constituent states, each of which has its own president, government, and two-chambered legislature, governing and legislating for the state under the provisions

Bridge on Beach Line.

of its own written constitution. The constitutions and local legislation of the different states are not identical, so that anything set down here in regard to political and legal conditions must not be taken to apply to Brazil as a whole, but only to the State of São Paulo, to which it refers; and as regards municipal powers, only to the cities dealt with, because the municipal councils have varying powers according to their classification and the powers pertaining thereto, as provided in the State laws, which are themselves subject to revision. The cities in which the following experiences were gained are the coterminous municipalities of Santos, the port of the State of São Paulo, and São Vicente, now little more than a residential suburb of Santos. Santos is the greatest coffee shipping port in the world. Imports are of the most miscellaneous description, and it is the only port for an area about equal to that of England, with a population of over four millions, which has no coal or metal production of its own, and of which the food and raw material production has been put in the background by the more profitable coffee, whilst the development of railways and certain industries is being pushed on with some energy. It is a very big importer of manufactured goods, as well as some food stuffs and raw materials. Another class of imports is formed by emigrants, mostly from Portugal, Spain, and South Italy. The majority of these go straight to the coffee plantations, but a considerable fraction stay in the towns, and as the town-dwelling Brazilian is rarely a manual worker, labour of all kinds is chiefly recruited from these mixed emigrants, with a leaven of native people of more or less obviously African descent.

This constitution of the available labour force is a very important element in both the construction and the operation of tramways and similar undertakings. The majority do not come with the idea of making a home in the country. They are anxious to make a little pile and get back to Europe. This induces restlessness in many of them, and such pilgrims are easily induced by the prospects of higher wages or cheaper living to move on to another job or another district. This is a serious disturbance to any undertaking like a tramway, which tries to standardise wages, and to advance men by classification, merit, and length of good service, and in fact it resulted in Santos in a perpetual flow of men through the lower ranks, and a disproportionate amount of work on the supervising staff in selecting and training men. It was not uncommon to find that an applicant neither readily spoke nor understood Portuguese, using his native Italian or Spanish, with such modifications as he had picked up. This difficulty was soon overcome by most, partly because the three languages have considerable resemblance, and partly because everyone in Santos soon becomes habituated to the composite pronunciation and mingled vocabulary. Reading and writing are accomplishments not well grasped by these emigrants, and many are rejected at once for ignorance of those arts. The accepted standard, especially of spelling, had perforce to be very moderate, and few were the official reports from car crews and inspectors free from words or forms of spelling unknown to Lusitanian.

Another branch of education which had to be carefully examined is knowledge of the currency. This consists of paper, silver, and nickel. The paper goes down to values as low as the equivalent of 16d., and there are many different issues of the various values. In the metallic currency there are several different mintages of both silver and nickel, the size and weight of coins of equal value varying greatly. The silver coins have milled edges, and the nickel coins smooth edges.

Such unskilled manual labour as is needed for tramway construction is fairly abundant; skilled labour is not in satisfactory supply. There are good Portuguese masons and carpenters, and fairly good iron-workers of the same nationality who are on the whole honest and industrious, but in many cases stupid, in a curiously patchwork fashion. That is, a man who has been found trustworthy over a long period of time will lose his judgment when he comes up against a small novel difficulty, and do something astonishingly stupid. Such experiences breed a sense of distrust, and impose a minute surveillance that is very trying to the supervisor. The best technical workmen are the Italians, who are particularly good at electrical work. Some are expert in less desirable ways, but many are thoroughly reliable. The Spaniards who get to Santos are generally not of a desirable type. They are less skilful, educated, and industrious, and more prone to develop temper and to foment discontent among their fellows than either of the other races.

Trade unions hardly exist, but strikes are not rare, and are liable to arise at very short notice, and for trivial causes. In spite of the mixture of races, the men show considerable capacity for concerted action, especially in the direction of "lightning" strikes. The police always take an active part, and do not hesitate to deport foreign agitators and strike leaders, as they lawfully may. There is a strong tendency to violence, fostered by the prevalent habit of carrying revolvers and a certain strain of impatience. We had a fortnight's strike of about 300 pick and shovel men, engaged on construction work, and a lightning strike of car crews, which lasted about two hours on a Sunday morning. In both cases impatience and fiery oratory were the immediate provoking causes, the men having been promised substantial

Altering Rail Levels—Drain Trench Alongside Track.

improvements in wages and other conditions, which were being formulated when the strikes occurred. Anonymous threatening letters are common incidents of these disturbances, but in my experience such violence as occurs is generally among the men themselves.

These labour conditions oblige the superintending staff to think out all work, whether construction or operating, in great detail, and to give minute instructions providing for every foreseeable contingency, and to maintain a close watchfulness in order to prevent extensive trouble from unforeseen contingencies, on meeting which some subordinate may, as likely as not, take the wrong turning. The safe rule is to

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impress on subordinates to pull up and get instructions when difficulties arise which seem outside anything contemplated, but that cannot always be done, and it comes to sleeping with a telephone at the bedside, and always keeping within call—conditions which become a little irksome at times.

Clerical work, such as records, time sheets, and simple accountancy, is more easily provided for as there is a fairly good supply of educated Brazilians available, but men fit for real responsibility in this branch are rare, are mostly in safe positions with good firms, who treat them as members of the family, and they, therefore, have to be trained and selected, and carefully supervised in the process. Responsible officers in "public utility" companies, therefore, find that in all branches they have to exercise surveillance over much detail work which at home they could safely confide to subordinates. There arises from this a much closer knowledge of the continuous detailed working of all departments, which has its advantages from some points of view, but when combined with the general direction of operations, the formation of plans for the future, and the heavy correspondence inseparable from the condition of obtaining all important supplies from abroad, it becomes somewhat exacting, especially in hot weather.

It was the author's lot to be appointed chief engineer to a company operating the water, gas, electric, and tramway undertaking in Santos.

Temporary Arrangements—Mule and Electric Tracks Side by Side.

About half the track-mileage of the tramways had already been operated electrically for about 18 months; the remainder was worked by mule power, on narrow-gauge tracks laid on sleepers, and to a large extent worn out, because the original concessions were nearing their limits, and negotiations for a new concession involving electrification had been on foot for some years. These negotiations continued for several months, but eventually a contract with the municipal chamber was signed, which included among its conditions that of making an effective commencement within six months, and completing the lines for electric working within two years of the date of signature. It was only possible to definitely place contracts for the plant and material after the signature of the contract, as, until then, there was the chance that the company might not get the new concession. Orders were placed at once, on conditional tenders already received, and special shipping arrangements made, including the chartering of one steamer for a direct voyage, saving from two to four weeks spent in intermediate ports by the regular cargo liners. There was another cogent reason for securing early delivery, viz., that under the then existing Budget Law the company had obtained formal permission to import the construction material "duty free," and the permit expired at a perilously near date. By very good organisation at the London end, by offering bonuses for early delivery, and the special shipping arrangements mentioned, the desired ends were secured, and the material delivered in time to save the differences between full duty and "free of duty" (which is a long way from no duty) and to permit of the construction going on steadily from the contract date.

In the meantime, there was plenty of local preliminary work to do. The position of all new construction in the streets had to be approved by the prefect, and that officer being advised by gentlemen who had recently completed the excellent theoretical engineering course of Brazilian Universities, but had not much practice in their profession, there was a great deal of discussion, and not a little alteration of plans before there was a clear road for a start. Some of the alterations were rather serious and caused a good deal of trouble. The worst involved a length of three miles of double line in a relatively wide road or avenue. The prefecture engineer assured the writer that it was desired to have central grass plots and flower beds in the said avenue, and gave the track centres to correspond. This was communicated to London, and some sets of junction and other special work ordered to suit. When the plans prepared on this basis were put before the prefect he strongly disagreed, declared that the engineer had only given his personal views, and insisted on the centres being closed in. But not to the standard distance for double track. Wishing to make the road into an ornamental avenue with trees on the footpaths and other embellishments, he emphatically required the company to conform to his æsthetic tastes by the use of centre posts between the two tracks. Now the tramway posts had to carry the electric supply feeders and distributors as well as the tramway feeders and a number of private telephone wires, a burden which did not tend to grow less. It was clear at once that a line of central posts could not comfortably carry that burden, and that the end would have been three lines of posts instead of two. After a very tedious controversy, mostly in the form of personal interviews, aided by freehand perspective drawings to illustrate the effect on the appearance of the avenue of the various arrangements of posts and wires, the prefect gave way, and agreed to the standard clearance between track and side posts with span wires. Then the question was how to adopt the special work already made and delivered to the altered track centres. It was done, of course, after much exercise of ingenuity by three or four people, but there remains in the double line a kink, only too painful to the critical eye, and superficially inexplicable (for the road is straight enough) due to the incompatibility of two sets of special work which had to be adapted to the altered centres, and could by no means, having regard to their other connections, both be made to align with the road centre.

Levels gave lots of trouble. Much of the new track had to be built on roads marked out, but not made up, a long length on the seaside sand, where no road was; and even on much of the paved streets it was desired by the prefecture to take advantage of the tramway reconstruction to alter the drainage falls, because, in a very level town, varying between 5 ft. and 10 ft. above high tide, and subject to tropical downpours—an annual average rainfall of 120 in.—storm water drainage was quite a problem, and stood in need of improvement. The prefecture engineer had to give us the rail levels, and he did his best. But there are no bench marks and no official or other plan giving reference data. So we generally got references to the doorsills of house number so and so. This was not so bad, and as we took care to verify the relative levels of the various doorsills along each line, any little discrepancies were cleared up before they gave trouble. In one case we had the rail levels defined as at the intersections of certain projected streets, the positions of which streets were only marked on a certain plan with a scale of 1 to 10,000, and with regard to this length I was horrified to receive notice from the prefecture engineer who had been asked to pass it for traffic, that it was seriously out of the prescribed levels, and must be put right. After satisfying myself, we levelled it jointly, and he then agreed. Now, this engineer was not the one who originally gave the levels, there having been a change in the meantime, and we found that the supposed discrepancy arose from a clerical error in the number of a certain house, the doorsill of which served as a reference level, and a slight uncertainty about the position of some of the projected streets. In levelling for construction we took the right house with the wrong number on the prefecture level note, and the new engineer had very naturally taken the right number (by his list) but the wrong house when he checked the work.

On the seaside line, which had to be built over an open expanse of fine sea sand, we had as references the deck of an existing bridge about a quarter of a mile from one end of it, and the decks of two projected bridges of which we had only the intended position pegged out. We had to conform to intended drainage levels of a projected seaside drive, in between, and to build a bridge ourselves at another point, where a small river debouched. This small estuary, discharging on to a loose sand beach, did not stay long in any one place. A heavy rainfall, especially if coincident with high tides and rough seas, shifts the channel in a few hours. We therefore decided to build the bridge at a convenient place in the dry, and when it was all ready, turned the river under our bridge. A few days after one of the coincidences occurred, and the river, trying its best, but vainly, to get to the bottom of the concrete piers which throttled its stormy flow, perversely turned along outside the approach embankment and tried to cut that away instead of flowing straight out to sea. Quite a number of people had to sit up all that night, throwing down truckloads of granite rubble to protect the work, and no harm was done.

One of the worst troubles about levels occurred in an old street well in the town. This was a street in which the prefecture hoped to remedy flooding by giving it a switchback longitudinal profile, with gullies at the valleys of course. On one length this was done to a degree which at once appeared exaggerated, and was queried, but confirmed in writing; so we put in the rails to the prescribed levels. When the prefecture engineer first became alive to the result, he did not like it, but could not deny that the rail levels, given by his predecessor, had been adhered to. The prefecture eventually came to the conclusion that someone had blundered, and instructed us to lift the

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track, by amounts reaching 18 in. at the lowest point, at its own expense. Whilst this was in hand, it was determined to rebuild the rain water sewer, right alongside our track, and as this meant opening a 6-ft. trench at the edge of our concrete in a fine sand subsoil which runs like water if it is either very dry or very wet, that piece of track had to await the convenience of the sewer contractors to be put into traffic. At another point in the same street, where another important line crossed it, the new levels produced a dip from all four directions, but no gully or even sewer was provided until our traffic had been several times stopped by flooding there. That unfortunate street had the electric line built and ready for traffic, so far as the company's work was concerned, for about four months before it could be used—a serious matter, not only from the direct loss of traffic, but also because it was wanted to take the place of a parallel mule line which could not be interrupted for reconstruction until it was replaced.

The prefecture was quite right to endeavour to improve the street drainage, and to take advantage of the tramway reconstruction. The unfortunate thing (for the company) was that it could not resolve what to do sufficiently early to prevent the jobs clashing. The prefect meant well, so did his advisers, but they had not done such a job before.

The company's position with the prefecture was somewhat awkward. In effect there is no appeal from the prefect's decision, there is no Board of Trade to settle points in dispute, and though arbitration is provided for it is of little use whilst construction is in progress, because the prefecture can embargo construction, and with a time limit for completion, and serious penalties even up to the cancelling of the concession for exceeding it, there are strong inducements to avoid quarrels. So one had to be very diplomatic, to trust a good deal to time and patience, and amicable conversations; and fortunately this procedure succeeded, and the reconstruction was so far complete that all the contract lines were open to traffic and all the contract routes in operation nine days before the expiry of the two years—to the great relief of several people.

It was necessary to keep open for public use the various routes operated by mules, until there was in each case an electric service ready to take its place. This took some scheming. A programme was got out and approved, by which the whole procedure during the reconstruction period achieved this end. It naturally involved a number of temporary services, both on the mule lines and the electric lines; and changes in both had to be made, as between one day and another, as the work progressed. The original programme was a good deal interfered with by such troubles as have just been related, but the object of maintaining a service in every district was achieved with so much success that there was hardly a grumble from the public, even in the hottest or the wettest weather, and the traffic receipts rose steadily as electric working extended. The receipts on the mule lines, especially the net receipts, had a very sickly appearance in the last few months of operation, as was unavoidable, but there was, fortunately, a good market for mules in good condition, so we did not keep many idle for more than a few days after a route was knocked off. The best of the mule cars were converted into trailers for the electric lines, provided with new wheels and axles of the wider gauge, fitted with draw bars, electric light, and so forth.

The method of track construction adopted on the beach lines and on certain unformed streets where no definite levels could be given, and no paving had to be provided immediately, was with cross sleepers, using a native hard wood called peroba. On the beach lines Vignoles rails were used, but B.S.S. No. 3 grooved rails in all the paved streets. In these streets the choice of substructure presented some difficulty. In the earlier electrification concrete stringers had been used, and at the date at which the method for the new work had to be decided, the earlier work had had barely two years' service. On one particular length of two miles the concrete stringers had given very unsatisfactory results. They were broken transversely in two or three places in every rail length, and had sunk bodily, but unequally, along nearly the whole length. This particular road had suffered a deep excavation for the building of the main sewer not long before the line was constructed, and the haunches of the road had been left open and below the track level for long distances and periods after it was in traffic.

It was obvious that the subsoil—fine sand—waterlogged at no great depth, was in constant movement, laterally, towards the sewer excavation, as well as vertically, and after careful examination and observation of levels and joints, I decided on cutting out the concrete stringers, and substituting hard wood sleepers. This made a temporary improvement, and at least has the advantage that subsidence and movement can be readily corrected by packing. It was plausibly supposed that the particular length of line described was not a fair sample, but it very soon appeared that there was no part of the originally electrified line on which the concrete stringer substructure was really in satisfactory condition, or could be expected to afford good running for any length of time. With this evidence of the unsuitability of stringer construction on a fine sand soil in a very wet climate, suggestions were made that either a concrete raft, or sleepers should be substituted. Either alternative has its difficulties. The prefecture rather disliked the concrete raft on account of the difficulty of access to rain water drains, which in many cases run under the centre of the street and the track. The cost is also very heavy, and it is not at all clear that a concrete raft on a sand bed, liable to become a running sand at frequent intervals, would be a good investment. Hard wood sleepers, on the other hand, whilst they facilitate re-levelling and alignment of the track, are inconvenient to pave over, and the paving over them soon tends to become irregular, sinking between the sleepers. In the face of these obvious difficulties, it was thought least risky to keep to concrete stringers in the older and central streets, where it was hoped that all settlement was at an end: and in certain other streets where settlement was known to be in progress, hard wood sleepers were used.

Very special care was taken with the stringer work to keep it of full section, and also to ram into the trench bottom some inches of broken granite. To what extent these precautions will justify the choice of the method it is, perhaps, too early to say, but the writer saw much evidence in the later work, done with the greatest care, that transverse fracture of the stringers is unavoidable. One feature which seems to account for this is the use of anchor plates at the rail joints. It is clear that an anchor plate embedded in a concrete stringer weakens the concrete longitudinally, and also as a beam, so that any lack of uniform support from the subsoil is likely to result in fracture near the joint, as actually occurred in many cases.

Another effect, particularly in tropical climates, is that a rail heated and expanded by powerful sunshine, and held to the concrete at the joints, will hog and lift itself from the concrete at its centre. This also occurred in the new work, and caused severe "pumping" through the marginal paving. It was remedied by grouting with either pitch or plascom between the base of the rail and the concrete. This seems to be quite a good method of waterproofing the interface of rail and concrete, and worth trying in original construction. So far as the writer has seen, there is no method of securing a tram rail to concrete substructure by anchor plates, clips, Lewis bolts, or any similar contrivance which will, for any length of time, keep the surfaces in watertight contact, and prevent pumping. This is especially true in a climate with a powerful sun. The effect of sun heat is especially great during construction, and it is desirable to shield the rails from the sunshine by wet sacking until they can be paved to, or to cover them with earth, if the paving is much delayed. On one occasion I saw 200 yards of concrete stringer torn asunder at every rail joint (*i.e.*, anchor plate) because this and other precautions against sun effects had been neglected. In a climate subject also to heavy rain, it is most important to make the paving follow the concreting closely; if that cannot be done, then some temporary filling, such as earth, should be put in. We found it worth while to pave temporarily with old setts with sand-filled joints at a time when the definite paving was delayed by causes beyond our control, or in some cases with old sleepers cut to fit between the rails, but in these cases we also had to consider the interests of the general vehicular traffic.

The Old and New—Beach Line, Vignole Rails on Sleepers.

Going back to the effect of sun heat, the unpaved Vignole track on sleepers moved a good deal at the short radius curves, occasionally as much as 4 in. laterally between night and day. At such places the sufficient precaution is to leave the sleepers equally free at the ends. I have seen in England rails buckled and crippled by sun heat because some sleepers were boxed up hard at the ends, whilst others were free to move—and did so. A curious rusting effect occurred on the seaside Vignole line, which was exposed to spray. The fish plates rusted rapidly, not only on the outside, but also on the inner faces next the

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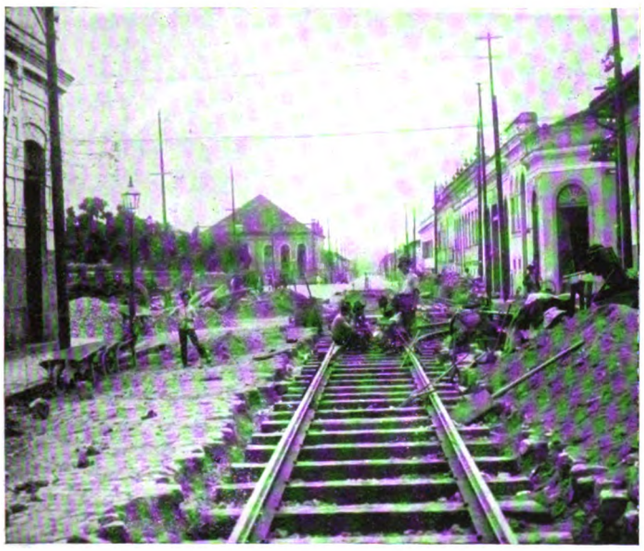
rails, whilst the rusting of the rails themselves was not excessive. Both rails and fish plates were from the same American manufacturers, but there must have been a material difference in their composition. After seeing this, the fish plates were taken off, scraped, and painted, and the process repeated as often as required. Of course, the painting was not nearly so effective as if it had been done on new fish plates.

No difficulty was experienced in running the same cars on both grooved and Vignole rails. Crossings on the Vignole track are of the American filled-in pattern, *i.e.*, the gaps at the V's are filled in and planed to form inclined paths for the flanges, so that they are equivalent to grooved rail crossings. Also the points are double-tongued, provided with levers and independent springs, and can be set as automatics at turnouts, or left open for hand working, and locked up in either position. They occasionally gave trouble by sticking open with sand during squalls from the sea, which are somewhat frequent, but derailment from this cause was rare, perhaps because when it took place the driver was punished for not looking out. He knew of the points and experienced the weather, so ought to have acted with appropriate caution.

These squalls from the sea gave a good deal of trouble one way and another. All our wires, electric light and power, and tramway feeders, pilot and private telephone wires were overhead, carried on tramway poles on the tramway routes. The telephone company's wires were also overhead; they were mostly No. 18 and 16 galvanised iron, which has not a long life there, and were carried on posts 40 ft. to 60 ft. in height, made of old rails, spaced about 80 yards. They were aligned with the tramway posts on the streets; on the beach, where there was a pretty heavy telephone line, they were on the sea side of the tramway, the house connections crossing to the houses with long much-sagging



Sleeper Track with Grooved Rails in Street.

spans, since the houses were mostly one-storied, and the posts high. Our circuits on the tramway poles included high and low-tension alternating lines, tramway feeders, and telephone wires. So when a squall came from the sea, and the telephone company's rusty iron wires broke, they rarely failed to short circuit something or other of ours, and occasionally trolley and alternating feeders and telephone wires exchanged currents with annoying results. Generally, of course, the light iron wires of the telephone company burnt off at the first contact, and I rearranged our lines to facilitate that by making the top wire on the post an earthed outer of the high-tension alternating. Perhaps the most annoying thing to us was when the fallen wire succeeded in crossing some of our telephone wires and a feeder, burning out the heat coils in our exchange and our instruments, and leaving us with communications cut just when we most wanted to know what was wrong and where. I think the telephone company got the worst of it on the whole, and both parties suffered sufficiently to lead them to co-operate in measures to reduce the annoyance, by dint of which measures considerable improvement was gradually effected. Generally, these squalls were accompanied by deluges of rain, so that the emergency repair gangs had an uncomfortable job. It is not at all nice feeling for broken wire ends in the dark, with a furious wind and rain, and the knowledge that any wire end met with may be alive. Nor is it all that one could wish, replacing fuses in a pole box on a 3,000-volt line, in similar weather and darkness, especially knowing that there may be a short still on, which will make its existence decisively evident when the contacts get home.

Usually these squalls were over in from half an hour to two hours; but I saw one that lasted from about 11 p.m. to 4 p.m. the next day. It was of the dry variety, and extremely violent. Telephone wires were down across our lines in dozens of places, all the available line staff was out by midnight and got our lines all clear for the first cars at 4 a.m. The telephone company's main line to the beach, running on one of the avenues, was a fine sight; the wires were continually crossing and sparking as they made and broke contact. It was our current that sparkled, derived from various broken ends of theirs, across ours.

A somewhat remarkable fatality resulted from an accident of a different kind to overhead wires. A man resolved to cut down a palm in his front garden, and managed to do it so that it fell towards the street, striking one of our posts in its fall, breaking a bracket arm and doing other damage, stopping tramway traffic for a time. It crossed one of our telephone wires with a tramway feeder. About three miles away one of our men was on a pole connecting up a house service, and touching the same telephone wire. The poor man fell to the ground from the shock and fractured his skull. When the owner of the palm called on me to try to settle for the damage done to us, he was incredulous when told that his palm tree had killed a man, but I got something for the widow out of him. There are no coroner's inquests in Brazil. This is not altogether a disadvantage in a community where violence, carelessness, and ignorance cause a large loss of life; but some of the procedure in reference to accidents is rather troublesome. For instance, if a person is killed in a public place by violence or accident, the police send for a certain official to take a note of all the circumstances, and meantime will not allow the body to be disturbed. Obviously that means that the police are to judge whether he is really dead—where he lies.

In one case I was called about 5 a.m. by my bedside telephone, and advised that a car had killed a man, and the police would not allow man or car to be moved until the proper official came. I got to the spot, passing on my way the breakdown gang, with jacks, etc., whom the police had told to return to the shed until they were sent for. Naturally I told them to get back to the stopped car. On arrival I found the unfortunate man lying against the brake plank, and satisfying myself that he was dead, waited for the official. If I had found that he might be living of course I should have had him out in about two minutes, and got a surgeon to him, whatever the police did; but there was no sense in being arrested for the sake of getting a dead man out a few minutes sooner. It is desirable to keep on good terms with the police. It was their practice, in the event of any accident involving a car, to arrest the driver. This was highly inconvenient to the traffic, and with some little discussion I got the chief of police to order that the arrested driver was to be allowed to take his car on, accompanied by the policeman, requisitioning a relief driver to meet the car at the earliest opportunity. This worked better, but the men very much disliked arrest—the place of temporary confinement was highly uncomfortable, and the charge for board much too high for their pockets—so that a man who had an accident was strongly inclined to jump off and run away before the police arrived. This habit was strongly discouraged, and became less common. It was very annoying to the management.

To return to some construction matters. The new cars were shipped with the bodies knocked down, in a form that proved very convenient, The floor and the roof of each car were used as the bottom and lid of a packing case, all the seats, posts, fittings, fastenings, and appurtenances of that particular body being packed between them, and the sides planked round. Each body, therefore, formed a unit package with everything belonging to it inside. There were thus no separate boxes of small fittings and fastenings to go astray and delay the erection of every car, and even if a whole body were lost, which was unlikely, the others were complete. Such packages are necessarily carried as deck cargo, and the combination of sea and rain water and tropical sunshine is quite surprisingly destructive to some materials. For example, we found a good many curtains rotten on delivery; they seemed to have gone through a kind of fermentation, and should evidently have been packed watertight. Trucks, also sent as deck cargo, with the axles in place, in several cases had the journals deeply pitted, showing the desirability of protective painting or greasing; if the latter, a very heavy grease is necessary, or the sun will run it out. On the whole the packing and carriage were well done, and with the precautions just noted may be safely imitated in future cases.

Obviously the erection of cars requires a certain amount of preparation in the way of lifting appliances, tools, and at least a few men accustomed to the work. We were fairly well off in these ways, having a shed provided with ample pits, workshop with all ordinary tools, overhead crane, etc., and a staff of mechanics; but anyone starting a new job in such countries should make sure that the shed, lifting tackle, some sort of a shop, and a few mechanics will be available by the time the cars come to hand, as lying packed up in the open in the tropics causes rapid deterioration. The man in charge of the erection should know in every detail how the parts go together, and the proper routine of erection. Either he, or someone who will take his instructions, should know the workmen's language fluently. It is not right to send out a man to take charge of an important construction or erection job, and to pick up a new language at the same time. Misunderstandings,

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delays, mistakes, and quite unnecessary labour troubles are sure to occur. A man set down amongst a new language gets for a time a quite demoralising sense of stupidity, and if he has to work with signs and gestures and half-understood words on both sides, cannot do himself justice. A competent interpreter, of course, eases things very much, but is not always easy to find for work involving technicalities, workshop phrases, etc., expressions which are often strictly local, especially among somewhat illiterate people. For example, there are many technical expressions used in Portugal which have different equivalents in Brazil, although the literary language is the same. A rail is a "carril" in Portugal and a "trilho" in Brazil; a sleeper is a "travessa" and a "dormente" respectively, and a tramway car is a "carro Americano" in Lisbon, but a "bonde" in Rio.

One has to get accustomed also to the way of treating workmen of a different race. With Latin workmen in general it is very easy to offend a man's dignity by language or tones which seem quite inoffensive to an Englishman. I have many times seen an English engineer or foreman astounded at the outburst of passion caused by what was only meant to be an ordinary reproof or correction. But when you know how to do it, the men will take reproof quite seriously and effectively, without a sign of anger. It is a good point with them, too, that they are usually not above learning, and if they think their superior knows his job will admit their ignorance, putting the blame on to the inferiority of their education, to which the Portuguese and Spanish mechanic is frequently bitterly alive. I must confess to a decided liking for the Portugese workman, both at home and in Brazil.

An important feature of tramway operation in Santos is parcels and goods transport. The conditions are favourable, because, outside the business centre the roads are bad, between Santos and its chief residential suburb, São Vicente, the only practicable road for vehicles includes a long stretch of the sand beach, which, between high and low water marks affords a good surface for light vehicles, but not suitable for regular commercial transport. Hence we carried nearly all the goods consumed in São Vicente, where there was a convenient receiving and delivery station, and two others in Santos A regular service of goods cars was run on all routes, starting from the respective receiving stations, and delivering the goods at the consignees' street doors. Small parcels and letters were also carried on passenger cars, being handed to the conductor *en route*, or to any of the receiving offices.

Every afternoon from four to six meat vans were run from the municipal slaughter houses into the city, delivering their contents at the various meat salesmen's shops. One employee of each firm was permitted to travel with the meat train to ensure delivery of the right goods. A good deal of the meat was distributed from the car shed yard, where salesmen's carts awaited the arrival of the trains, and the jolly butcher boys were such a tough crowd that we had to ask for a policeman or two to be in attendance to prevent regrettable incidents.

The company also furnished goods trucks to persons transporting large quantities of material on either a distance or a time rate. If by distance the time occupied was limited and the time rate applied beyond the limits. It was found advantageous to keep a loading gang at the disposal of customers, charging for them by tonnage and the nature of the goods handled. This was particularly useful in the case of bricks, earth, and building materials generally, which had to be delivered at any part of the route contiguous to the works in progress, necessitating running to the nearest cross-over road or turnout whenever a service car came along. It was much better to have our own loading gang than the customers' in these cases. Over most of the district the sanitary authorities insisted upon considerable filling-in of the natural ground surface before building any residence, as the natural surface was generally too low for drainage and often swampy. A good many cubic yards of earth went to every house, and as the company possessed a granite quarry where a good deal of superincumbent earth lay above the upper surface of stone, quarrying for concrete material during the reconstruction afforded a large by-product of earth, for which and its transport extensive building operations offered a ready market. In streets with single lines and considerable passenger traffic, we only did this heavy chartered transport work at night. There were also standing contracts with factories and others for the transport of goods and fuel, as the company had a railway siding serving for rail and sea carriage. In one case we contracted to carry all the ironwork of a suspension bridge from the railway siding to near the bridge site, for a government department, providing loading and unloading.

For this goods traffic we had motor-equipped open wagons and box wagons of 6-ton capacity, trailer open and box wagons of 4 and 6-tons capacity; and trailer box wagons specially fitted for meat carriage. As there were no gradients worth mentioning, a motor-equipped wagon easily took two trailers, or three meat wagons, and kept time with the passenger cars. This goods traffic gave a very good net revenue, and there seems no reason why something like it should not be workable and profitable in some British districts, but it has got to be properly organised from the start and, of course, run at competitive rates.

Passenger traffic was rather better distributed over the day than is usual here. The workmen's traffic was at ordinary fares, and only heavy on certain short routes. The business traffic was mainly of office and tradespeople and superior employees in the docks and government offices, of which the customs is the most important. This extended over the hours 7 to 9 a.m. and 4 to 6 p.m. But there was a considerable breakfast traffic between 9-30 and noon (out and in), shopping and visiting in the afternoon, mostly by ladies and children, and to and from the city in the evening by the frequenters of cafés, theatres, and cinemas. One item which surprised me at first was the heavy bathing traffic during several months of the year, starting with the earliest outward cars about 4 a.m., returning up to about 7 a.m. In a climate where 60 deg. F. in the shade is "cold," and every sunny day is hot enough to make quick walking uncomfortable, the riding habit develops with great rapidity, and the annual expenditure per head on travelling is considerably higher than in temperate climates. It is noticeable, too, that tramways in all tropical and semi-tropical seaports seem to do good business, and it is not difficult to understand why this is so.

There was no Saturday half-holiday, but on the afternoons and evenings of fine Sundays and recognised holidays, given fine, warm weather, the pleasure traffic was enormous. Most of it was to and from the seaside, where there were various resorts, brilliantly illuminated gardens with free entrance, cinema shows, music (but sitting down entailed the ordering of a drink), roller skating, and certain other riskier entertainments, not advertised but well frequented, and occasionally raided by the police, public gambling establishments being illegal. Naturally, everyone wanted to stay until the end, and then they all tried to get home together, which called for all the cars we could run. It was nothing unusual for a motor car and trailer, seating together 69 passengers, to account for 100 fares on these trips, and as the extras were largely on the footboards, it was pretty sure that a few fares were missed. A few bogie trailers seating 60 passengers apiece, originally the passenger cars of a part of the system then worked as a steam railway, were of great use on these holiday rushes, and, with the motor car, would often account for 150 fares per trip. Fine warm Sundays gave much better gross receipts than weekdays.

One of the Avenues—Concrete Stringer Construction in Progress.

The most curious special traffic to English ideas is that on November 2, All Souls' Day, when practically the whole population visits the cemeteries, where most of the graves are decorated for the occasion. Given fine weather, during the whole of the daylight hours the lines to the cemeteries, two in number, were worked at their full capacity, every car full. On the last occasion when mule traction was in use, the day happened to be very hot, and two or three poor mules died as a result of their exertions in the heat.

Passenger cars were frequently hired out for funerals, especially in the case of children. I was rung up one Sunday afternoon by the traffic superintendent to know if he might accept an order for a car for an adult's funeral. I had only been there a few weeks, so I said, "Why not?" He answered that it was not the custom, children only were taken; I replied that it would be quite a good custom to start, and it became fairly common among the poorer classes, who previously had to choose between the very expensive horsed hearse and carriages, or the laborious trudge of a funeral on foot, with bearers.

The carnival gave us something to do; the practical jokes carried on in the cars worried the conductors, and sometimes led to quarrels. On some of the short city routes, bands of young men would take possession of cars and make several round trips, much to the annoyance of others, who awaited the cars at the terminus and could not get on them. But the most trying feature was the crowded condition of the streets and squares, some of which we simply abandoned to the

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revellers, diverting the cars to other routes during the thickest hours. Some of the religious festivals called for special services at special hours; for example, on Easter Sunday morning a procession at 3 a.m. between two of the churches called all the faithful into the city, and we had to have every car man on duty at 2 a.m. on that day. With this excellent start a fine Easter Sunday was likely to give the highest takings of any day in the year.

Twenty years ago Santos had one of the worst of reputations as a den of yellow fever, but its character is now clear, and of late years it has become a popular health resort for the people of São Paulo and the coffee planters of the interior. From April until August the seaside hotels are full, and lots of private houses are let to up-country visitors. As the seaside is three miles from the city and has no shops, and as there were frequent dances at the different hotels, and lots of visiting between relations and friends who could not so easily visit each other at their own homes, these bathing visitors provided a welcome addition to the ordinary traffic, and proved to be worthy of some special provision.

In the working of an undertaking of this kind at a great distance from the source of supply, very long views have to be taken in ordering all consumable stores. As long as delivery times and voyage times are fairly regular, and the rate of consumption is regular too, it is a matter of simple calculation, but a very considerable margin of safety will be added by the wise man. Sometimes quite incalculable elements upset the best laid plans. The coal strike in England in 1912 held up manufacture and shipment, cargo steamers being ordered to proceed at slow speed to save the precious fuel. After the strike there was a tremendous rush of goods to Brazil, and as these great shipments came to hand, the Santos dock labourers thought it their turn to strike, and held up the shipping for several weeks. As

Beach Line Terminus—High Water Reaches the Foot of the Bank.

a result the dock quays were piled solid, as well as the warehouses, with every possible variety of material from end to end. Lots of material stood in the open for two months. Nothing can be moved, of course, until all the customs formalities are complied with, but in several cases we had ourselves to lead the search of the authorised labourers for urgently-needed articles, and it came expensive. At this period we got very near indeed the bottom of our stocks of consumables, and spare parts; and in the electric light department had to shut down some urgent installation and line extension work for absolute famine. Naturally, other people were all in the same boat. We lost, at this time, a dozen sets of points and crossings: they went up to São Paulo and were delivered to the tramway yard there, where, some weeks later, our general manager happened to see and recognise them. This little accident held up certain trackwork quite badly. At the same time a traction motor generator set and two transformers, of which we were in desperate need, for growing demand had filled up all the plant we had, were delivered after six weeks on the quays, so soaked through that they none of them had any measurable insulation resistance; and the drying out to a reasonable figure consumed another three weeks.

These experiences make one inclined to put quantities in the homeward indents, that rather surprise directors and secretaries, who quite properly feel the hardship of paying for stuff which may lie many months in store before it earns its value; and indeed a swollen stores account is a bugbear. It is little use telling a shareholder who sees a credit balance shown in the accounts quite out of proportion to his dividend, that the revenue earned has been put into stock, and that is the aspect which more particularly appeals to directors. As a very well-known director once reminded me when I said that my section of certain work was necessarily the last completed, because all the other parts held me up, "No, you are not the last; I am the last when I have to face the shareholders." At the same time, the man who is immediately responsible for a public service which is growing rapidly in dimensions, must work for safety, and in this, as in so many other things in this mixed world, a working compromise has to be arrived at, each side trying to see the other fellow's position, as well as his own, and considering it all he can.

I ought to say that in the strenuous work of tramway reconstruction which I have touched on, I had the very valuable assistance of Mr. R. Leigh Griffin, a member of this Association who will be known to many here, in immediate charge of the track construction; and that the company's consulting engineers, Messrs. Mordey and Dawbarn, did everything possible in the preparation of plans, specifications, orders, and in making special forwarding and shipping arrangements, in which they were ably assisted by the London office staff to facilitate the work of us men on the spot.

The CHAIRMAN: When I heard that Mr. Sayers was going to give us his experiences in Brazil I anticipated that we should have a very entertaining, instructive, and useful paper. I am sure the members of the Association will agree with me that we have just had a paper which is not only exceedingly interesting to all of us, but will also be most interesting to our Colonial members, of whom we have a considerable number. Mr. Sayers seems to have gone through a lot of vicissitudes. I daresay he might have wished sometimes when he was at Santos that he had only got that dear old Board of Trade to deal with. His experiences seem to have been very difficult; he was very properly practically under police control the whole time. I am pleased he has lived through it and been preserved to give us the benefit of his experiences. (Hear, hear.) The paper is an interesting and a descriptive one, and does not, I think, need much criticism. Still, there are one or two gentlemen who may possibly like to assist in the discussion, but before calling on them I will ask you to accord Mr. Sayers a vote of thanks for the trouble he has taken in presenting it to us. (Applause.)

THE DISCUSSION ON MR. SAYERS' PAPER.

AN ADVENTURE IN TURKEY.

Mr. C. W. SHEPHERD (general manager, Edinburgh and District Tramways): Whenever foreign tramways are mentioned, the small experience I have had in the matter causes a sensation as though water were trickling down my back. If the paper is meant to give you an idea of the paying qualities of foreign tramways, then possibly it would have added to its value if a balance sheet had been published of the company Mr. Sayers represented. I had the honour, before the Turkish War, to represent a company that has had a dash at almost every foreign tramway opened for the last 10 or 12 years; and we started off, a water engineer and myself, from Charing Cross with very great hopes of getting the lighting, watering, and the tramways concession for the City of Adrianople. We took with us one interpreter, but before we had done we had six—the other five were robbing us—and we did not know whether we had got an honest man among the whole crowd. To commence with, before we got to the great bay at Constantinople, the interpreters told me that out of the contract, perhaps involving £300,000, they had promised to give back to these people, interested or disinterested, £150,000 as presents, and I was wondering how Mr. Sayers got on with the prefecture engineer in getting over these difficulties; he has not said in the paper how much the prefecture got. Well, it got so hot in trying to get this concession that at the finish I think I would have promised anything, seeing the whole thing was a fiasco. After interviewing the head officials at Constantinople I found there was another extra £200,000 to disburse, which made the presents we had promised about £350,000. So I said to my friend, the best thing we can do here is to promise whatever they ask for, and get our expenses cut down as much as possible, so that instead of us entertaining they afterwards entertained us until we left the country. (Laughter). We had something to be thankful for in regard to the outbreak of the Turkish War, because all the gentlemen concerned came to Edinburgh. They could not speak English, but through their interpreter they gave me to understand they wanted their money. Well, I am pleased to say, that I sent them back to London, and then they had to go back to participate in the war. But if the paper is meant to try to get the members friendly

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towards foreign investments, seeing what my experience has been I should say "Don't." If it is meant, as Mr. Sayers says, to show the difficulties, I entirely agree with him and advise you to keep your money in this country. (Applause).

Success of the Auckland Tramways.

Mr. C. G. Tegetmeier (chairman of Auckland Electric Tramways Company): I have very little to say except to express my appreciation of the very interesting paper Mr. Sayers has read to us. It is particularly interesting to those of us, as Mr. Shepherd said, who are concerned in enterprises in foreign countries. By the term foreign countries, I do not know whether Mr. Shepherd includes the British dominions abroad as foreign countries, because if he does, I cannot endorse his recommendation to people who propose to provide the capital for foreign tramway purposes not to do so and to keep their money here. I might instance as a foreign tramway, if we use the word foreign as comprising enterprises in British dominions, the Auckland tramways, where certainly if we had followed Mr. Shepherd's advice we should have had very great cause to regret it. That company is now operating about 42 miles of tramway track, and from a population of 110,000, is taking over £260,000 a year in fare receipts, representing nearly £2 10s. per head per annum of the whole population. With a capital expenditure of over a million, the company pays nearly 8 per cent. on its ordinary shares. As I say, Mr. Sayers' paper is particularly interesting to those of us who are concerned in foreign enterprises, and it is specially so to me as being concerned with the Auckland Tramways Company. There we had to a large extent some of the difficulties, though perhaps not to the same extent as Mr. Sayers had in Brazil, particularly in connection with construction. The system adopted was a concrete stringer, which Mr. Sayers states was adopted in Brazil, and in Auckland we found that that was entirely inapplicable to the conditions. The tramways have been running for some 12 years, and now nearly the whole of the concrete stringers have been pulled up and replaced by wooden sleepers, which are standing very effectively. I have nothing more to say, except to again thank Mr. Sayers for his paper and to assure him that it will afford a deal of interest to the representatives in Auckland of the Auckland Tramways Company.

Concrete Stringer Construction.

Mr. R. Humphries (Birmingham and Midland Tramways Joint Committee): While thanking Mr. Sayers for his most interesting paper, there is just one point alluded to by Mr. Tegetmeier which is personally interesting to me, and which may be elucidated with advantage—that is the paving on the concrete stringer construction. Mr. Sayers says, after weighing in the balance so far as concerns sleeper construction and concrete stringer, he decided to keep to concrete stringers, and I take it by the context that one of his reasons for retaining concrete stringers was that they lend themselves to sett paving. My experience of the concrete stringer is that it is an abomination. Having to deal with many miles of track in the Black Country, which run over pit sinkings, we find that the transverse sleeper is the only class of construction that holds up its work. (Hear, hear.) There is just one point that I should like information on, and that is as to how sett-paving can be made to stand over concrete stringer construction. Personally, I should have thought that the road surface would stand up just as well on transverse sleepers.

Mr. W. T. Robson (general manager and electrical engineer, South Shields): I should like to ask the reader of the paper if any use was made of guard wires in Brazil, on account of the frequent breakage of the telephone wires.

Mr. Sayers' Reply.

Mr. H. M. Sayers, in reply, said: I thank you all for the very kind way in which you have acknowledged my efforts to entertain you. In regard to Mr. Shepherd's experiences in Turkey, in South America things are not so bad, but I do not advise anybody to seek a tramways or other concessions in South America unless he knows the language of the country and the methods of business. The methods of business there are not such as people are accustomed to in the city of London. It is useless to get into a state of moral indignation when faced with a different moral standard which, in fact, is not so bad as some people think. At any rate, tramways in South American cities pay their shareholders pretty well. In the case of the Santos Company, it is public knowledge that they pay a steady dividend of 7 per cent., as well as providing proper debenture charges, and I think that is pretty satisfactory. I can not tell Mr. Shepherd what it cost to get the concession, but it was nothing extravagant. I am much obliged to Mr. Tegetmeier for his appreciation. I think, sir, from what he has said, and what he has told me personally, the Auckland conditions are pretty much like ours as regards sub-structure. Probably they did the right thing. Mr. Humphries refers to the paper, and asks why we decided to adopt concrete stringers. The words are, "In face of these obvious difficulties, it was thought less risky to keep to concrete stringers in the older and central streets, where it was hoped that all settlement was at an end; and in certain other streets where settlement was known to be in progress, hard wood sleepers were used." That is, we chose to endorse the evils we knew, and did not risk others we were not so certain about. It is difficult to make sett paving stand evenly over concrete stringers, but it is more difficult over transverse sleepers. As to guard wires, we had no guard wires. The electric and traffic regulations were drawn up in conference by myself and the prefecture engineer. I translated the Board of Trade regulations so far as applicable as a basis, and no guard wire regulation was included in those agreed upon. (Loud laughter.)

STANDARD TRAMWAY RAILS:

Comparison Between English and Foreign Sections.

By Fred Bland, M.I.Mech.E.

The question of standard rails for tramways has been a prominent one during the past 12 months. The question of replacing certain of the British standard rails being under the consideration of the Engineering Standards Committee, which, connected with the fact of extensive renewals of tram tracks now taking place in this and other countries, and the great movement that is being made towards the standardisation of such renewals both in regard to rails and tramway trackwork, the writer thought that the present Congress was a good opportunity of laying certain information before members of the Congress in the hope that it might be of assistance to them in their future decisions.

The large diagram placed before you shows the existing British standard rails, together with the French and German sections, and also a combined section of the British Standard No. 4-7 in. deep against French U.T.F. 7 in., and German No. 4-A 7 in.*

The writer presumes that all members know the British standard rails, and therefore does not describe these. They consist of No. 0 (of which none have yet been rolled), 1, 2, 3, 4, and 5, with the corresponding sections for curves known as 0-C, 1-C, 2-C, 3-C, 4-C, and 5-C.

The principal section rolled in England during the past year has been the No. 4, which now appears to be the favourite section for English tramways, followed by the 6½ in. rails Nos. 1 or 2. It is now suggested that the new sections should consist of Nos. 2, 3, and 4, retaining the old dimensions with the exception of the bottom flange, which will be reduced to a uniform width of 6½ in. It has also been proposed that a new British standard section, to be known as No. 6, should be adopted as shewn. This will be rolled with a 12 in. radius on the running edge and $\frac{1}{32}$ in. thicker head. The web will be moved nearer the centre of the rail and slightly strengthened; the flange will also be 6½ in. wide. The calculated weight of the rail is 112 lb per yard.

A shallower rail, 5¾ in. deep, to be laid on sleepers for light railways has also been suggested, but as these sections are not yet approved by the Engineering Standards Committee, I have not included them in the printed illustration.

With regard to the radius on running edge, I believe that the Leeds Corporation were the first tramway to use a tram rail with a 12 in. radius, this being decided upon after exhaustive tests made on their tracks, and I find on different tramways that 12 in. is the approximate radius which all sections of tram rails take after several years' wear, no matter whether standard or otherwise.

On examination of the combined section shown on diagram, it will be seen that the only difficulty in the way of having a European standard section is the difference of ¼ in. in the depth of the groove, and this I am afraid will always remain a difficulty.

The running treads are practically the same. The German rail has 10 in. radius, the French 12 in., and the English 12 in. (presuming this is adopted). The difference in the thickness of the heads is very little and could easily be altered. The webs could also be uniform, thus allowing one of the fish plates to be universal as the punching, which now varies, could be easily rectified, and then only one special plate would be required for the guard side, instead of two joggled plates now necessary.

The table given for English, French, and German rails will readily enable anyone sufficiently interested to compare the respective dimensions.

With reference to the American sections given on the diagram, it must be understood that these are not officially correct, and I am indebted to a paper written by Mr. Martin Schreiber for the small sections, from which these been enlarged and which appeared in the *Electric Railway Journal* on April 11, 1914, and to other sources of

* These sections are reproduced on pages 126 and 127.

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information. It will at once be seen that as far as this country is concerned, and, I believe, Europe generally, these proposed American sections are useless for practical consideration, owing to the different conditions prevailing here for tramway service.

America appears to have suffered in exactly the same way as we have done in the past, that is, from innumerable rail sections. (Many of you will, no doubt, remember the large sheet of rail sections exhibited in the Congress Hall at Blackpool last year, illustrative of this subject.) To an English engineer the American sections appear "fearful and wonderful," and would be the terror of a manager's life, if used on English roads.

The subject of standardisation of American rails was brought forward at the American Street Convention in 1907, when 16 sections were proposed. In 1909 two depths of rail, 7 in. and 9 in., were recommended, and in 1911 four designs were presented, but referred back until 1913, when the four sections now shown were submitted and approved by the Convention. The chief feature, apart from the design, is the increased depth of groove to $1\frac{7}{16}$ in. Thus the net result of six years' consideration was these four sections.

In comparing American and English committee work, I may say we are ahead of our American cousins in having had standard rails in regular use for some years, and it is actual traffic requirements which have created the demand for revision, while America has still to put these new sections into practice, with the possibility of a revision in a few years, at which time it may confidently be hoped that the revised English sections will have been proved to be satisfactory under all conditions. Finally, there can be no doubt that it is to the interest of tramway engineers to use two rails only, either $6\frac{1}{2}$ in. or 7 in., according to their present rails, and to put in standard rails in all renewals of track work—which has been largely done during the past 12 months—and thus permit manufacturers to still further standardise, and, what is quite as important, to stock rails and points and crossings so as to enable engineers to obtain small lots for repairs promptly and at less cost.

In connection with this subject, I would like to add that during the past year the question of standardising points and crossings has been very carefully gone into, and a report containing valuable information is now before the Engineering Standards Committee, which, it is hoped, will be shortly issued.

THE DISCUSSION.

The CHAIRMAN: It is my pleasure to ask you to accord a hearty vote of thanks to Mr. Bland for his paper on standard tramway rails. He has condensed a very large amount of information into a couple of pages, but the subject is one on which a good deal could be said and written. The Standards Committee have been a rather moribund body for some period of time; I hope and believe they are now getting into a position better able to be more useful to the tramway industry than in the past. It has been our desire to provide sections which would be of some use; practice has shown it is essential to obtain a rail with a good life to it. In comparing the various sections which Mr. Bland has shown, foreign rails as compared with English rails, the difficulty he has mentioned I am afraid is acute. When we commence to alter very seriously sections of rails we are met then at once with the many difficulties which are presented to us from time to time by that controlling authority, the Board of Trade, who are responsible in the past to a great extent for our not having a useful rail with a proper width of groove and a proper depth to the same. However, those difficulties have to some extent been overcome, and I trust in the future we shall be able to obtain the co-operation of the Board of Trade in enabling us to provide some useful sections which are now under consideration by the Standards Committee. The paper deals with a subject which is so absolutely vital to the tramway industry that I should like, if we could, to have a good discussion on it, and I should like to have your views. We have very little opportunity, excepting once a year, of dealing with a question of this sort in a general discussion, and it is a great advantage to those on the Standards Committee, who are entrusted to deal with this question, that they should hear the views of those who are most interested. And therefore, without any further words from me, I trust that those who represent you on the Standards Committee may be able to take some valuable notes, so that they can present those views when considering the tramway rail of the future.

Mr. C. W. SHEPHERD: I should like to bring out in this discussion, if members so desire, the difficulty we are having to contend with in Edinburgh, and the difference of opinion between the municipality and my company. In the first place, our rails were laid with the old dicker joints, and the dicker joint, as you know, has been found defective in consequence of having two indentures, and you thus get at the joint a knocking of your wheels. We had to cut the joints out, and we say, and I think with all fairness to the Corporation, that if there is a seven or eight years' life in a rail, we are quite entitled—and anybody else with common sense would say so—to put that rail back again in order to get that seven or eight years' life out of it. Under these circumstances I should like to hear the views of the members on that point.

Mr. W. T. ROBSON: The only remark I wish to make on these comparisons is the absence of any reference to the centre-groove rail, which has been used in two places, Hull and Doncaster, with extraordinary success, and it seems to me that it is quite worthy of some consideration in any comparison between English and foreign sections. I do not know where else it has been used except in those two places. My experience at Hull was that it is an extraordinarily useful rail, particularly at joints where, as it is possible to cut a rail transversely, one tread of the wheel is on the next rail before the other leaves the last, with an absence of any knocking or hammering.

Mr. J. W. DUGDALE (general manager, Oldham): I would like to interpose here, because the rail spoken of by Mr. Robson is not a standard rail. The meaning of the paper, I take it from the Chairman's remarks, is that it should be a leading up to something which a further conference can deal with. I thank Mr. Bland for bringing this forward along with some solution.

Mr. C. W. MALLINS: With regard to the replacing of rails, I think it is a very reasonable suggestion that Mr. Shepherd makes. Certainly if there are seven or eight years' life in a rail it should be utilised. That is only a common-sense proposition, and I think on the whole a very just proposition. I think it is very wrong of any authority to compel people to take away a rail with seven or eight years' wear in it.

Mr. W. B. PICKERING (Hadfields Steel Foundry Company): As representing the manufacturers, I have to thank Mr. Bland for the valuable paper he has put before the Congress. I think the question of standardisation is one we ought to aim at for all we are worth. What the result will be depends a good deal on the committee. It will help operators of tramways, and it will help the manufacturers to give quicker delivery. But standards will also help to reduce prices, and from a tramway manager's standpoint that is one of the ends they have in view. My experience in connection with one of the new sections, if I may be permitted to express an opinion—I am referring to the new section introduced at Leeds—is that the fish plate recess on the tread side has been very much reduced, which is somewhat increasing our difficulties in making good joints when you come to fish up the casting. Of course, on the ordinary track where you have a Thermit or electric weld it is not of so much importance, but when you come to manganese steel work, which we cannot weld—I do not know of any process by which you can do it efficiently at the present time—it is a consideration, and on special work there is, of course, all the more necessity for constant attention to the joints. I do not think I can say more at the moment. It is not so much a question for the manufacturer as for the permanent way engineer, and I should like to hear their opinions rather than express my own. At the same time, I am very much obliged to Mr. Bland for taking the trouble he has to bring this paper forward.

The CHAIRMAN: In view of there being no further discussion, I will call upon Mr. Bland to reply.

Mr. BLAND: I do not think I have much to reply to. Unfortunately there has not been a great deal of discussion. I had hoped that some engineers would have taken the matter up. Mr. Dugdale replied to Mr. Robson's question about the centre-groove rail, which is not a British standard rail, although it is a good rail. I made a comparison of standard rails only. The Leeds section, together with the Liverpool section, for the same reasons, I had to leave out also. When I tell you that during the past seven years there have been over 150,000 tons of British standard rails rolled as compared with only 60,000 tons of ordinary sections, it shows the very great importance of minimising standard sections, and bringing them down to one or two rather than the five there have been already. I hope this subject will be again raised next year, and to a greater extent by some tramway engineer more competent to deal with it than I am, and who would give actual working results.

The CHAIRMAN announced that an invitation to members of the Congress to inspect the works of Messrs. A. Reyrolle and Company, Limited, at Hebburn-on-Tyne, had been received, and also that members were at liberty to visit the tramways power-station, car sheds, and depot of the Newcastle Corporation, if they so desired.

Mr. C. W. SHEPHERD: I do not think we can adjourn this Conference without according a very hearty vote of thanks to our Chairman for the manner in which he has conducted the meeting. I am sure we are all delighted that one star should have been left to preside over us.

The motion was carried with acclamation.

The CHAIRMAN: I am very much obliged to Mr. Shepherd for his kind thought. I can only say that it has been a great pleasure to me, and I hope I have done my duty satisfactorily.

Alderman F. SMITH suggested that in future conferences the printed papers should be either taken as read or briefly summarised by the authors, as this would allow more time for discussion.

The CHAIRMAN replied that the committee would consider the suggestion.

The Conference then adjourned until the following day.

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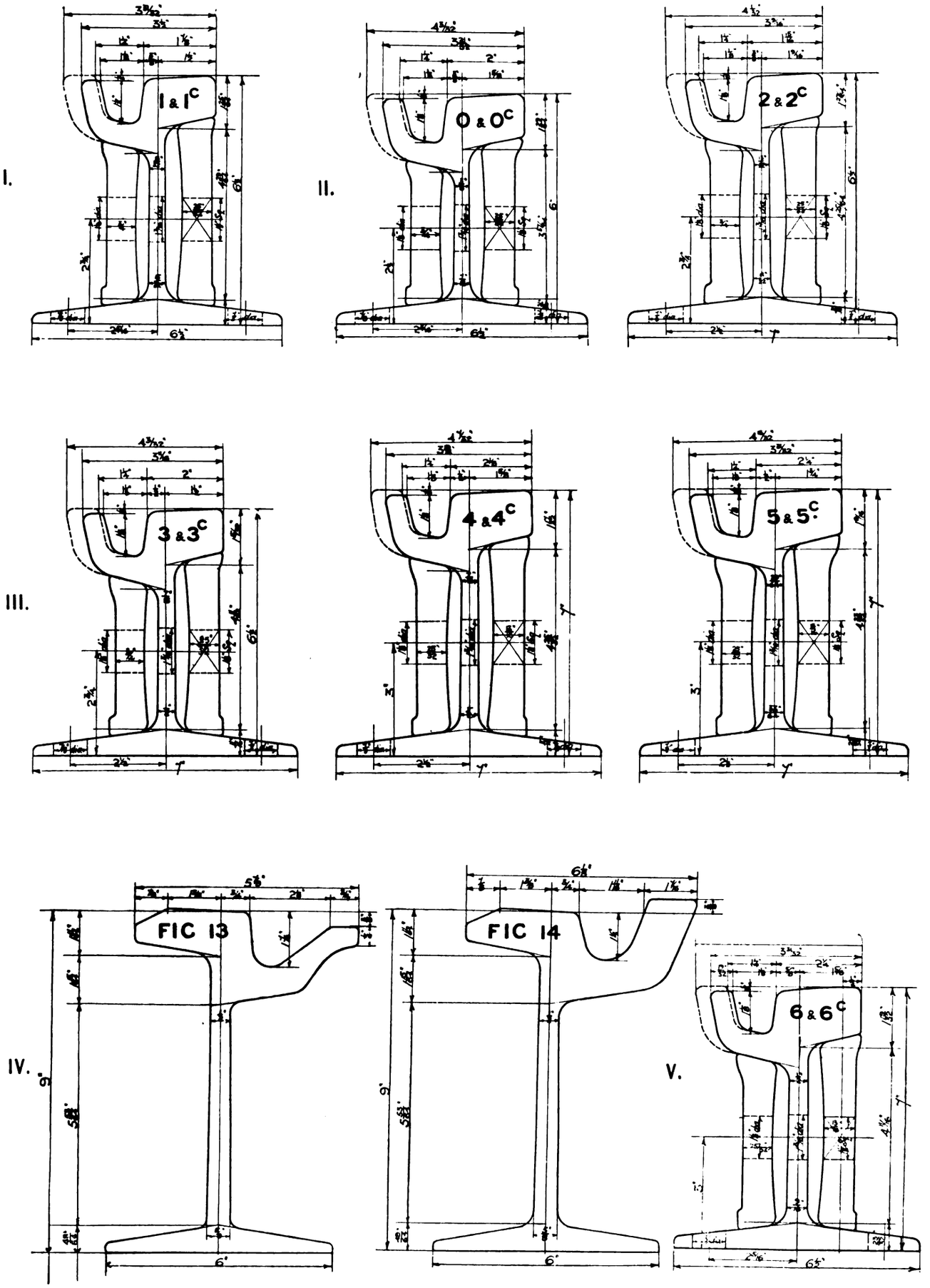

I.—British Standard Sections 1 & 1' not proposed to be used. II.—0, 0', 2, & 2' proposed to be retained. III.—British Standard Sections 3, 3', 4, 4', 5, & 5' proposed to be retained. IV.—Proposed American Sections. V.—Proposed New Section.

STANDARD TRAMWAY RAILS.—COMPARISON BETWEEN ENGLISH AND FOREIGN SECTIONS.

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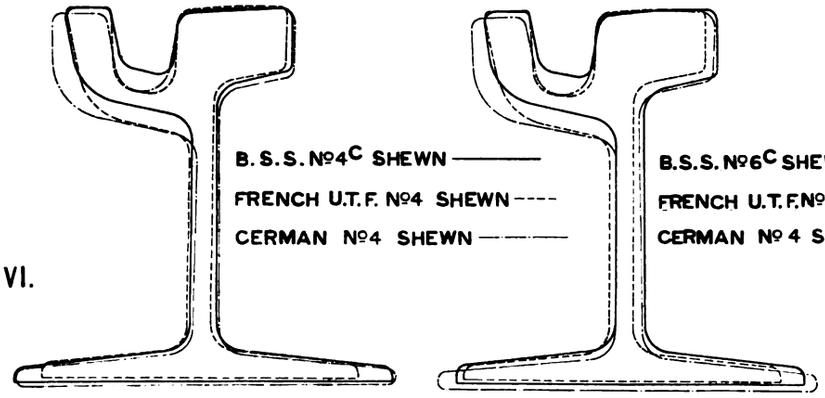
VI.



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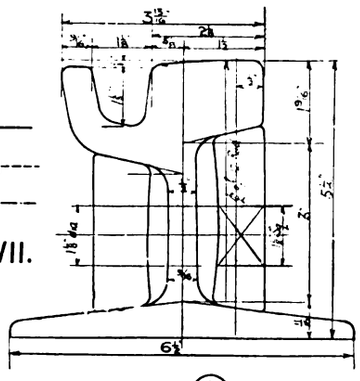

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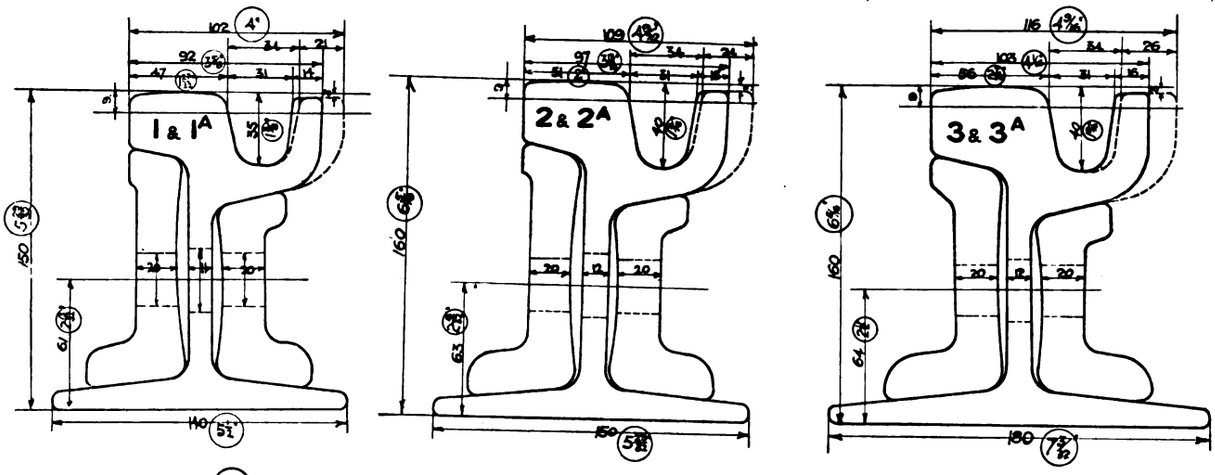

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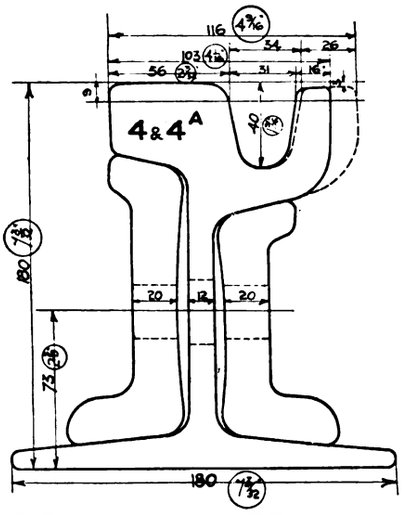

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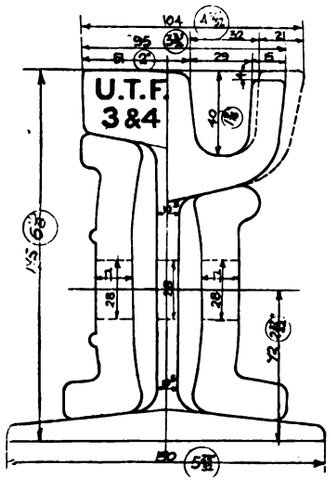
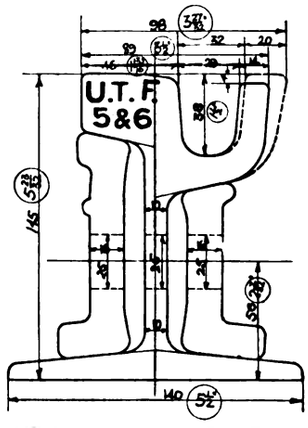
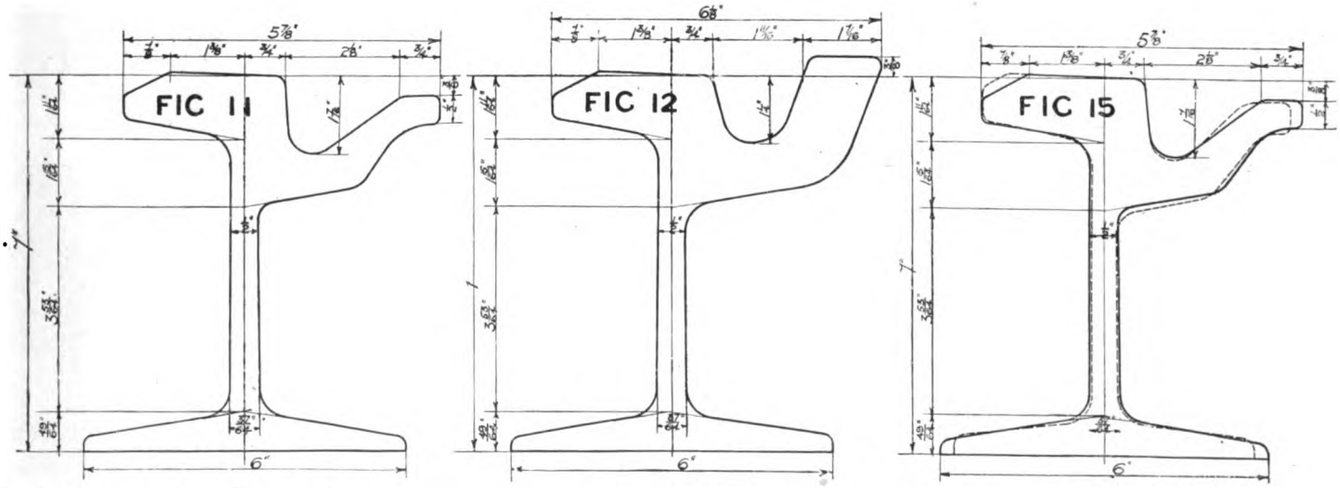




XI.



VI.—B.S.S. compared with French and German Sections. VII.—Interurban Section. VIII —German Standard Sections, 1 & 1A, 2 & 2A, 3 & 3A. IX.—German Standard Sections, 4 & 4A. X.—French Standard Sections. XI.—Proposed American Sections.

STANDARD TRAMWAY RAILS.—COMPARISONS BETWEEN ENGLISH AND FOREIGN SECTIONS.

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SECOND DAY'S PROCEEDINGS.

At the opening of Friday's session Mr. Stephen Sellon, M.Inst.C.E., again took the chair.

The CHAIRMAN: Before commencing, I should like to read the following telegram: "Please say a very grateful 'thank you' for me to the members of the Association. No life more utterly claims whole-hearted, unselfish, and happy service than that of the tramway officer. —Nance, Belfast." (Applause.) There are one or two representatives of the Belfast tramways here who may like to say a word on that telegram.

Mr. A. A. BLACKBURN (chief engineer, Belfast City Tramways): In the absence of Alderman Finnegan and Councillor McCaughey, we wish to thank you for the kind telegram you sent yesterday to Mr. Nance. Had Alderman Finnegan been present, he would have been better able to voice our personal feelings for your kindness. Mr. Nance will treasure your good wishes, and I wish to say that we from Belfast are very grateful for your kind sentiments towards him.

Mr. R. HUMPHRIES, before reading his paper, said: My thanks are due in the preparation of this paper to Mr. Tegetmeier and Mr. Little, of the British Electrical Federation, the Thermit Company, the Tudor Company, the Lorain Company, the Continuous Rail Joint Company, the Acetylene Company, and to our secretary, Mr. de Turckheim, for the very great assistance they have rendered me.

RAIL JOINTS:

THEIR CONSTRUCTION AND MAINTENANCE.

BY RICHARD HUMPHRIES

(Tramways Engineer, Birmingham and Midland Tramways Joint Committee).

In a paper read 10 years ago before this Association Mr. Connett humorously said that as there was no bad whiskey, only some was better than others, so there were no good joints only some were worse than others. He also said something that the writer would not have the courage to say on his own initiative. It was this: "It is well known that the greatest enthusiasts on the joint problem, apart from those who have joints to sell, are those having had the least experience. The more one has to do with the problem the less one feels on safe ground in recommending anything." This was written 10 years ago; let us hope that at the end of this morning's session we shall be a little less pessimistic than this. The writer makes no claim that he has in this paper exhausted his subject; if he raises an energetic discussion he will be well satisfied. He hopes that his hearers will give to others their experience of the joints he speaks of only from hearsay.

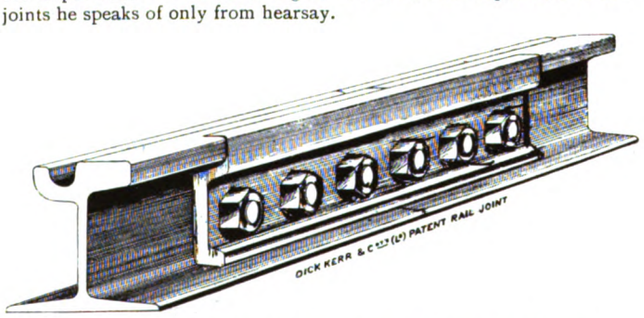

Fig. 1.—Dick, Kerr and Company's Patent Rail Joint.

MECHANICAL JOINTS.

Before the explosion of the "contraction and expansion" theory, mechanical plated joints held the field. Their weakness was, we suppose, held to be a virtue. We refer to the slip, or creep, that the loose-fitting bolts allow. The weird and wonderful sections of fish plates that have seen daylight—their name is legion. Only one, we think, stands out in much prominence, and that is the Dick-Kerr joint, in which the fish plate on the table side was scarfed into the head of the rail, and resulted in three joints instead of one, two transverse and one the whole length of the fish plate, directly under the weight of a passing car. This is illustrated in Fig. 1.

BRITISH STANDARD FISH PLATE.

On the principle of the survival of the fittest, or rather one should say of the least unfit, we come to the British standard fish plate. This is a six-hole plate weighing, for No. 1 B/S rail, 50 lb. to the pair. A simpler plate cannot well be imagined, but it still retains that curse of the family, that of allowing creeping to take place at every change of temperature. The writer knows of one Corporation system where the engineer specified that ¼ in. should be allowed between the ends of the rails when laid. The depressing effect of a passing car also causes this creep to take place, and this depressing effect is transmitted to the poor engineer in charge of the system, when the inevitable hammered joints appear. Out of 56 systems circularised in 1911, 52 admitted having dished joints, and possibly the balance of four were guilty of a "terminological inexactitude."

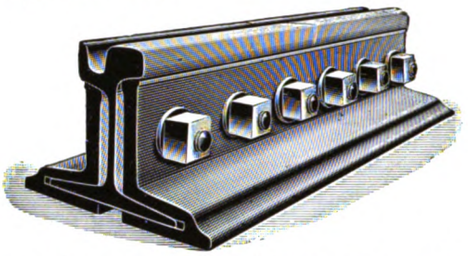

Fig. 2.—Continuous Rail Joint: Tramways.

CONTINUOUS RAIL JOINT.

The Continuous Rail Joint Company recommend what is practically a combined fish and sole plate; this is shown in Figs. 2 and 3, together with an ingenious keyed sole plate for fixing under joints. Many and various are the sole plates and anchors in use; they are of longitudinal and traverse types, but one and all only postpone the evil day. With single-deck or bogie cars and wide gauge, this day may be long postponed, but with high speeds, top-covered four-wheel cars on narrow gauges, something better must be found. (Figs 4 and 5.)

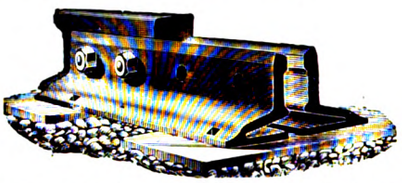

Fig. 3.—Continuous Rail Joint: Railways.

SCARFED OR BEVELLED JOINTS.

Scarfed or bevelled joints have been used to a large extent on the Continent. These are of doubtful utility as a square joint rarely dishes at the butt. The dish is usually one inch past this on the leaving side, undoubtedly being caused by the flexure of the joint causing the car to jump forward. It is now generally admitted that expansion and contraction must be combated and not allowed for as in the old days.

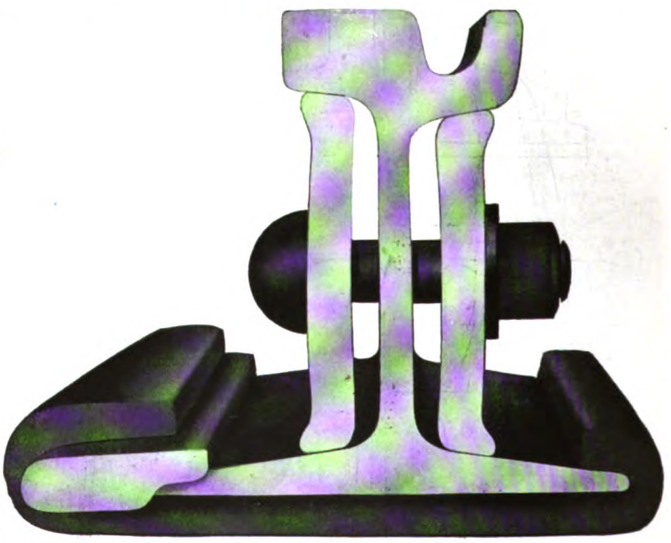

Fig. 4.—Winby Keyed Sole Plate.

Joints to be perfect must be strong enough to withstand temperature effects.

JOINT MAINTENANCE.

What can be said of interest under this head? The perfect joint should, of course, need no maintenance, but there are others. The

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general reply in regard to maintenance from the circularised systems before referred to was to the effect that dished joints were packed up or cranked fish plates fitted, but, of course, as this does not go to the root of the evil, the dishes again reappear. The writer has had considerable success with cranking fish plates.

The Brown-Crosta Plate, etc.

The Brown-Crosta plate is made to dovetail into the head of the rail after cutting out the dish. Mr. Fitzmaurice, the permanent way engineer of the British Electrical Federation, recommends a piece of inverted rail bolted under the joint, and after packing up burying solid in pitch concrete. Oxy-acetylene is used in some places to fill in the dishes, and the writer has had considerable success with arc welding for this purpose. This he refers to later.

The Ideal Joint.

Let us for one moment look at the conditions that hedge around what, for the purpose of discussion, we will call the ideal joint.

(*a*) The processes involved should be suitable for construction, reconstruction, and repairs.

(*b*) The plant involved should not be too cumbersome or costly, and should, if possible, be useful for purposes other than joint making, so as to spread capital expenditure over as large an area as possible.

(*c*) The skill involved should not be of too scientific a nature, local labour should be used and existing forces utilised in preference to the introduction of those of a fresh and costly nature.

(*d*) The joint itself should cover a fairly large area, so that the stresses imparted by passing cars do not come upon a small area of rail or joint.

(*e*) The process of joint making should in no way affect the nature of the steel, especially in proximity to the joint. Its strength and conductivity should be at least equal to that of the rail. It should withstand hammering without fracture, and also be capable of standing up to its work even if its substructure is washed out from immediately beneath it. Expansion and contraction must not affect it.

(*f*) Last, but not least, it should not be expensive.

It is left to our readers to consider which of the joints described in the following pages really fills the bill.

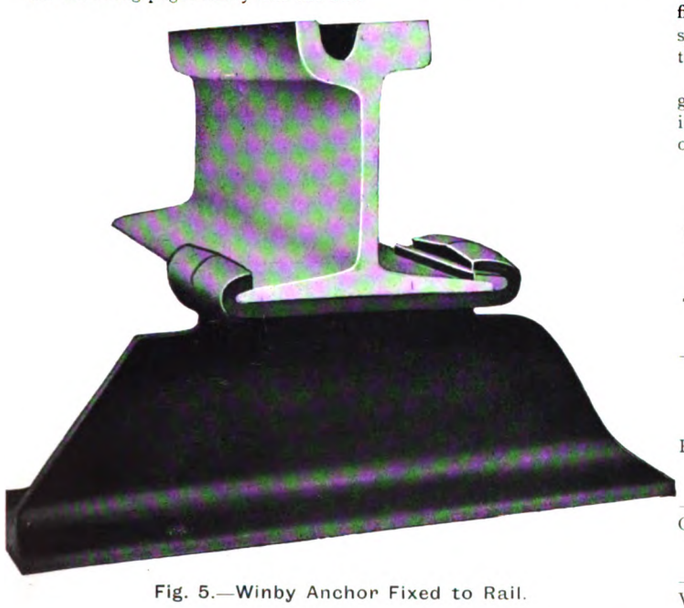


Fig. 5.—Winby Anchor Fixed to Rail.

Finally, we may say that existing methods roughly class themselves as follows:

(*a*) Fish-plated joints, with or without base support.
(*b*) Welded joints without fish plates.
(*c*) Welded joints with fish plates.

Personally, I have no hesitation in advocating the last on the list. The support of the fish plate enables the weight of a passing car to be well transmitted from rail to rail, and if the fish plate can be made to stay where it is placed, and the creep between the rail and plate abolished, we shall have a joint that will live as long as the rail.

Electric Arc Welding.

For some time past the writer has, on the permanent way of the Birmingham and Midland Tramways Joint Committee, been carrying out useful work with this process. On the principle that a doctor should take his own physic, the writer contends that electricity for an electric tramway company should have the preference, other things being equal. The "juice," like the poor, we have always with us, and the trolley wire is easily available for attachment.

A motor generator is fitted into an old tramcar, and this is run to any point on the line where welding is to be done.

The plant we employ is about 25-kw. capacity, thus taking about 50 amperes at 500 volts from the trolley wire. It will be seen that this demand is most reasonable, and no undue strain is put upon feeders or trolley wire. This 50 amperes at 500 volts is converted to 100 volts and 250 amperes for the welding work. The positive pole of the machine is coupled to the car wheels, leaving only the negative cable to be run out to the arc carbon and the weld. A steadying resistance is put in series with the arc, leaving about 70 volts across the latter

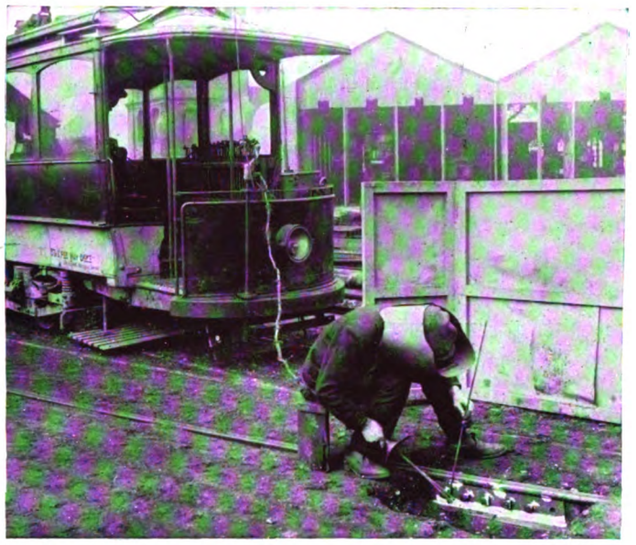
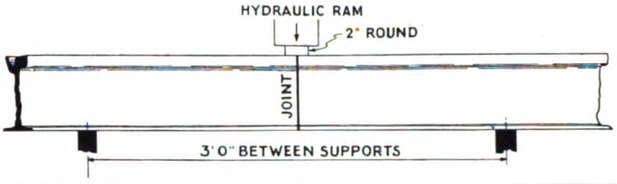


Fig. 6.—Arc Welding Fish Plates to Rails on B. and M. Tramways

when at work. High carbon steel sticks are used to feed the arc when filling in dished joints, a couple of units and a few minutes' work sufficing for this. The surplus steel is then ground and filed level, and the dish is filled with steel equally as hard as the rest of the rail.

The fields of the generator are excited from the trolley wire. This gives a steady voltage across the arc, and the operator has no difficulty in maintaining a steady flame. This, of course, also enables the whole of the generated current to be used on useful work.



	Load on Hydraulic Ram.				
	20 tons.	25 tons.	30 tons.	35 tons.	40 tons.
Plain piece of rail:					
Deflection	$\frac{3}{32}$ in.	$\frac{1}{8}$ in.	$\frac{5}{32}$ in.	—	—
Permanent set ..	Nil	Nil	$\frac{1}{32}$ in.	—	—
Ordinary fished joint:					
Deflection	$\frac{1}{8}$ in.	$\frac{5}{32}$ in.	—	—	—
Permanent set ..	$\frac{1}{32}$ in.	$\frac{1}{16}$ in.	—	—	—
Welded fished joint:					
Deflection	$\frac{5}{64}$ in.	$\frac{1}{8}$ in.	$\frac{5}{32}$ in.	$\frac{11}{64}$ in.	Fish plate burst across bolt holes. No rupture on weld.
Permanent set ..	Nil	Nil	Nil	$\frac{1}{32}$ in.	

Fig. 7.—Birmingham and Midland Tramways Joint Committee's Rail Bending Test.

Welding fish plates solid to the rail is a longer process and takes about half an hour per joint, and consumes about 10 units of current. The fish plates are first removed and the rail thoroughly cleaned and scaled before refitting the plates, which are then screwed up tight before welding.

The operating costs are quite low: 1s. covers the filling of a dished joint and 5s. a pair of welded fish plates. Fish plates are welded on to special work as well as to rails, and dishes in points and crossings are also easily handled. There need be no hesitation in using this process, as when the time comes for renewals the oxy-hydrogen blow-pipe will soon cut up the track for removal.

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Deflection Tests on Arc Welded Joints.

Interesting figures of deflection tests are given on page 129, showing that the welded fish plate fetches up a joint to at least the same strength as a piece of rail of the same section. Conductivity is also improved and bonds can be abolished. With 500 amperes passing through 19 in. of rail, the drop was found to be 12 millivolts, and with the same current and length across a welded fish plate, the drop was only 8 millivolts.

A similar but smaller welding set is in use, fitted on a four-wheeled cart or float, but, as this is of less capacity, the work takes proportionately longer. It has the advantage, however, that no interferences with the traffic takes place as in the case of the car, where one side of a loop has to be commandeered for its benefit. Another welding set is at work in our central repair shops, where it has earned itself the title of "The Scrap Preventer." All sorts and conditions of work are tackled, and the replacing of metal where removed by wear is now one of the stock jobs of the shop. The photograph in Fig. 6 shows an operator welding fish plate to rail.

Thermit Joint.

The Alumino-Thermit process, now so well known as Thermit, is due to the discoveries and patents of Dr. H. Goldschmidt. The process is briefly as follows: A crucible is filled with a mixture of aluminium and iron oxide in a state of fine powder. A portion of ignition powder is placed on the top of the crucible and this reacting at a low temperature

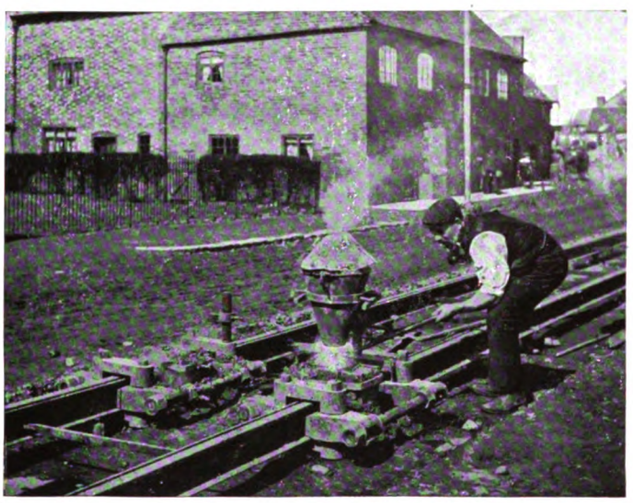

Fig. 8.—Thermit Welding: Showing Crucible in Position.

can be started with a match, and this reaction is carried on to the whole of the welding portion. In a minute or so, the crucible will contain molten iron with a layer of aluminium slag. The temperature reached is in the neighbourhood of 3,000 deg. centigrade. The metal is allowed to flow into a sand mould round the joint, and melting the metal of the web and foot of the rail forms one mass with them. About 20 lb. of compound is required for each weld, and the resultant metal round the joint in the neighbourhood of 10 lb. A very large

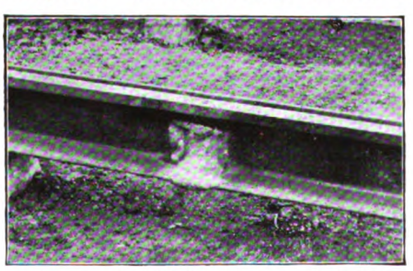

Fig. 9.—Thermit Welding: Completed Joint.

amount of thought has been expended in perfecting the details of the process. Thousands of these joints are in use, and over 60 tramways in the United Kingdom alone have some in operation. Work carried out by the Thermit welders is guaranteed for 12 months. Conductivity tests show that the conductivity of a welded joint is somewhere about 9 per cent. lower than that of the rail itself. A test on a piece of 105 lb. rail on 3 ft. 6 in. supports with 40 tons showed a deflection of ·1 in., on a jointed rail as well as on a piece of solid rail, showing that the weld is at least as strong as the rest of the rail. Skill and the greatest care is necessary to ensure success. (Figs. 8 and 9.)

Cast Weld Joint.

This process consists in casting an iron sleeve round the side and base of the rail joints. This was brought out originally by the Falk

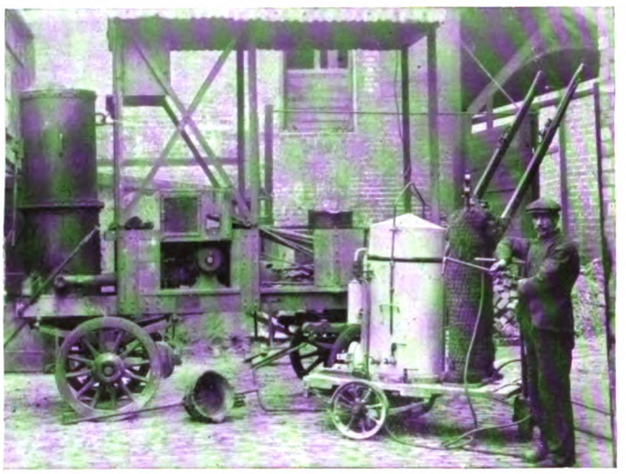

Fig. 10.—Cast Welding: Acetylene Plant and Cupola.

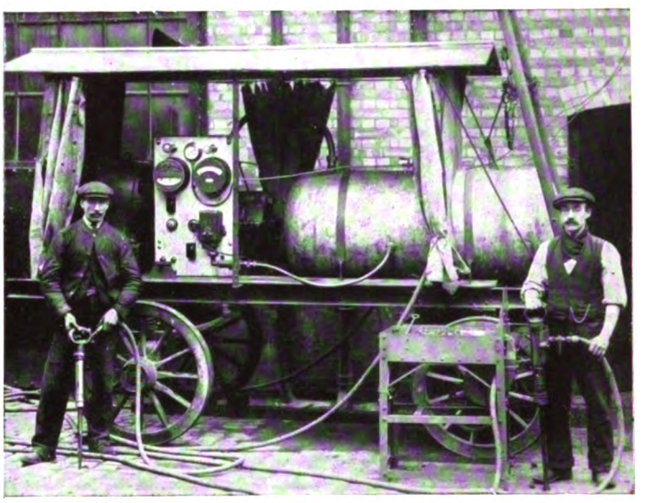

Fig. 11.—Cast Welding: Air Compressor Plant.

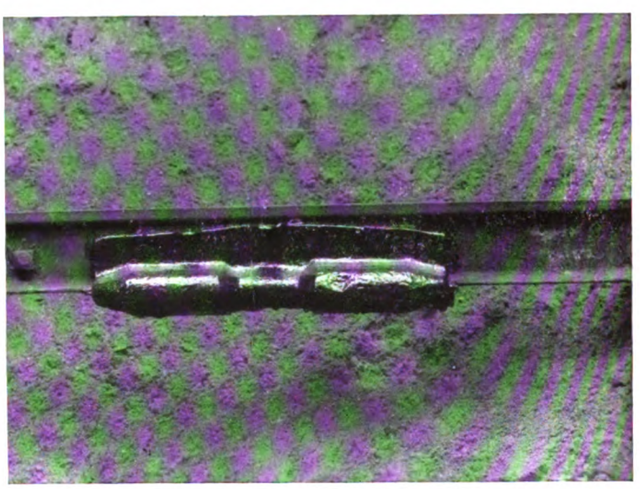

Fig. 12.—Cast Welded Dumb-bell Joint.

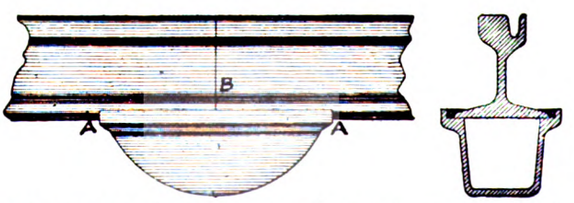

Fig. 13.—The Acetylene Illuminating Company's Joint.

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Manufacturing Company, of America. Before fixing the moulds, which are of cast iron, the side and base of the rail are well cleaned with an emery wheel or sand blast. It has been said that the joint is only a shrink joint and not a weld, but, as a matter of fact, the white hot metal poured in actually fluxes the face metal on the rail in contact with it, and if torn apart, the cast iron will bring away a portion of the rail with it. The original length welded has been largely increased, as it was found that fractures occurred in the short welds. The cast iron must necessarily be welded close to the work, and thus a costly and weighty plant must be put up in a portable form. The joints need to be made under a capable superintendent and with an experienced staff, or trouble is bound to follow. France, Germany, and the United States have had the largest number of these joints installed. To Mr. Winslow, of Norwich and Coventry, is due the credit in this country for the work done in recent years. Interesting photographs in connection with the above are shown on page 130.

THE D.A. JOINT.

The Acetylene Illuminating Company, of London, have introduced into England a French patent shoe for placing underneath joints in the

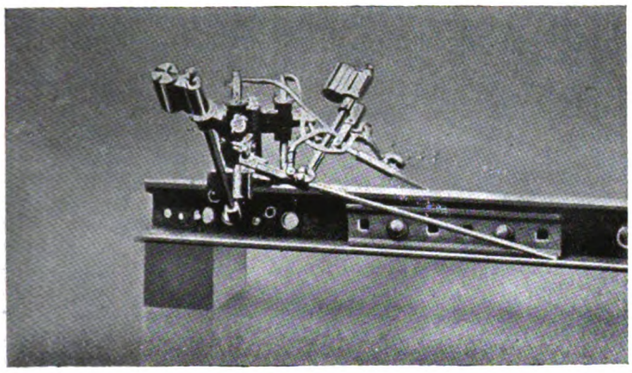

Fig. 14.—Tudor Accumulator Company's Electric Rail Welding.

form of a sole plate. This shoe is welded by oxy-acetylene gas to the base of the rail, and it is claimed that it has given satisfaction on the Continent. How it will stand the racking stresses of top-covered cars on a light railway gauge is, I think, another story. This is illustrated in Fig. 13, and is known as the D.A. system of jointing rails.

THE TUDOR JOINT.

The Tudor Company have developed in this country a method of electric joint welding, known as the Quasi Arc welding. The electrode consists of about 2 ft. of Swedish iron $\frac{3}{8}$ in. diameter, coated with slag. In addition to welding fish plates, the Tudor Company have a machine for welding a strip of metal on the tread of rails. This is about $\frac{1}{4}$ in. thick, which leaves a considerable amount to grind off. The Tudor

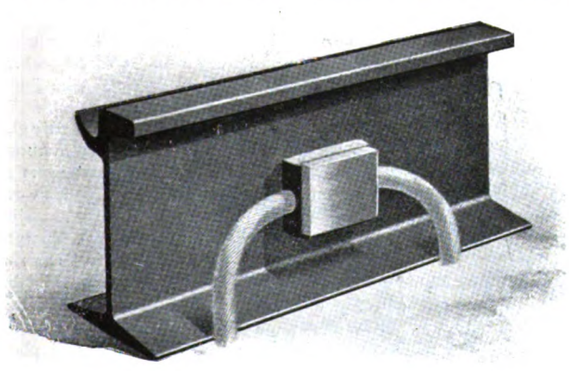

Fig. 15.—Ground Cable Welded to Rail.

Company are at present carrying on work at Liverpool and Glasgow. The price they charge is about 35s. per joint, current being supplied to them free of cost. An interesting illustration showing the slagged electrode in position is shown in Fig 14.

ERA MANGANESE STEEL.

Messrs. Hadfield, of Sheffield, the well-known makers of Era manganese steel, supply special fish plates in this material for splicing up different rail sections, and for lifting wrong rail ends. The durability of this material is very great.

THE LORAIN JOINT.

Electric butt welded joint.—The Lorain Steel Company have a process that is covered by the above heading. This requires a formidable plant as follows: The sand blast car; the welding car; the rotary converter car; booster and motor car; motor and emery wheel car for finishing.

In making a joint, flat rolled steel bars are used, having at each end a boss on one side, which forms the contact surface between the bars

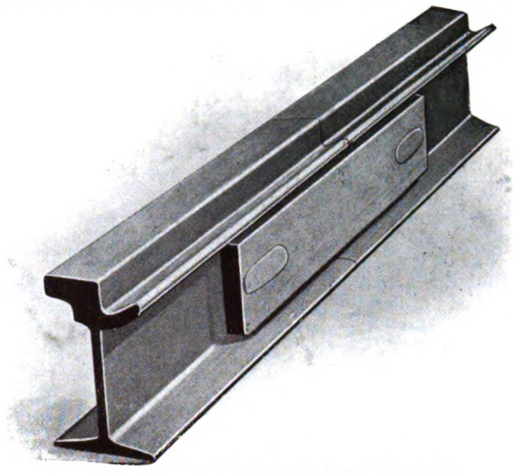

Fig. 16.—Electrically Welded Joint.

and the web (Fig. 16), and confines the welded area to these sections. A flat strip of steel $\frac{1}{8}$ in. thick and 1 in. wide is placed across the middle of the bars on the same side as the bosses. The middle weld is the vertical one and made the full width of the bar, the end welds being horizontal. The secondary of the welding transformer consists of one turn of copper, the terminals of which form the clamps that grip the weld. Great pressure, up to 35 tons, is maintained on the joint by an hydraulic jack until it cools. This pressure prevents crystallation of the steel, and absence of burning is secured by the large contact area. Five volts is maintained across the weld, and the current runs as high as 25,000 amperes.

THE DISCUSSION.

The CHAIRMAN: I am sure the Association is much obliged to Mr. Humphries for his very useful paper, and it is a paper which will, I hope, create some criticism. The advantage of papers of this nature is that they enable us to hear what others are doing, and if by a process of practical reasoning we can give some extra length of years to the life of the rails, a very excellent precedent is created. I do not want at the moment to make any remarks myself about this matter, because I should like first to consider one or two points before I do, but I will ask you to give a very hearty vote of thanks to Mr. Humphries for his paper. (Applause.) I am going to suggest that a few manufacturers who have their own special appliances for curing this great trouble should first give us their views.

Mr. R. STUTZ (Thermit, Limited): In the first instance, I wish to thank the author for his most interesting paper, but I hope he will forgive me if I do not altogether agree with him. Of course, I have no intention of saying anything unpleasant about any of my neighbours, or about what might be considered as competing devices, as I would prefer to leave that to the judgment of those interested. I am sorry to see that the author of the paper advocates the use of welded joints with fish plates. In adopting such a joint for new or reconstruction or relaying work, you have, of course, to count what will be the additional expense of fish plates and bolts, and such joints, therefore, in my opinion, do not fulfil, at any rate to the fullest extent, the requirements laid down by the author as to cheapness, although I must admit that the cheapness or otherwise of a joint can only be judged by the results obtained. (Hear, hear.) I do not know how long any of Mr. Humphries' joints have been in use, but I rather gather that so far they have not been in use very long. He does not say anything about the incidental costs, such as running of the special car, the current consumed, the driver's time, depreciation of plant, etc. Perhaps he will be good enough to say a word about it in his reply. As to the joint in which I am most interested, the Thermit joint, I may say that in days gone by we considered it sufficient to butt up the rails closely, and merely unite by welding the base and the web of the rail. The results of this system were, I think, not altogether satisfactory in all cases, and, therefore, we now eliminate the possibility of the head opening, even to the slightest degree, by butt welding the head. Since then our troubles have disappeared. We have also increased the electric conductivity of the joint, which is now fully equal to that of the adjoining rails. As to what constitutes an ideal joint, I am afraid I am hardly in a position to give my opinion, and, perhaps, I ought not to do so, but I have always been taught to believe that the most ideal of all joints is no joint, but a continuous rail.

Mr. J. BRODIE (city engineer, Liverpool): In Liverpool some five years ago we experimented with a special mechanical engineering joint

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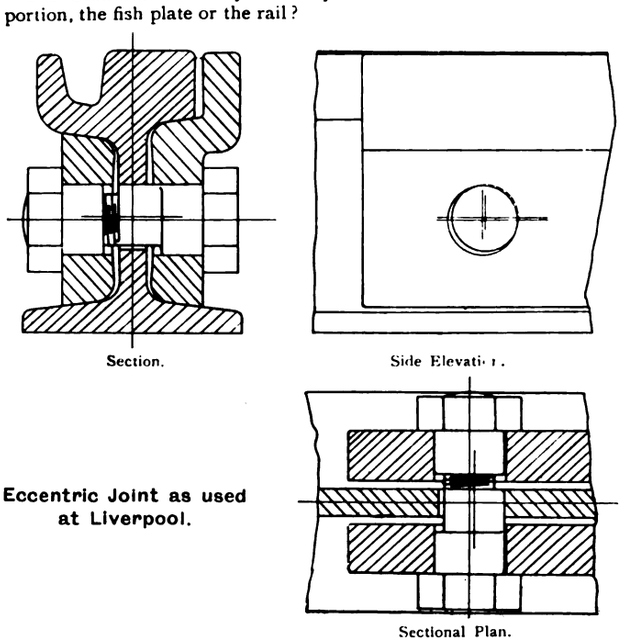
in which, as a mechanical engineer originally, I have a good deal of faith. I also had another reason for experimenting with mechanical joints, as our friends with the special joints naturally keep up their prices, and it is up to us to get their prices as low as possible. The joint to which I refer is a fish-plate joint with three eccentric bolts on each side of the joint, the idea being to jam the two ends of the rail very tightly indeed up against each other before being finally tightened up, and so to prevent the possibility of any movement at the joint. 1,500 of these joints have now been in use in Liverpool for over four years, and so far we cannot tell from an inspection of the surface where the joint is. It is probably a little more expensive, taken on the whole, than either the Thermit or the Tudor joint at present prices. There is a patent on it, and although this joint was designed by me before the patent was taken out, it was not in actual use in the street, and, therefore, the patent and the credit of the joint must go to the other gentleman.

The CHAIRMAN: Will you kindly tell us which is the eccentric portion, the fish plate or the rail?



Eccentric Joint as used at Liverpool.

Mr. BRODIE: The bolt. We have three bolts on each side of the joint, the eccentric portion bearing against the web of the rail, and we have a head on one end of the bolt and the nut on the other. At the time of putting the joint together, we draw three wrenches together on each side of the joint and get a very strong pull to bring the two ends of the rail into absolute contact, and when in that position we tighten up the nuts and so lock them together.

The CHAIRMAN: Mr. Brodie has set a very good example for a general discussion, and I hope to hear a good many members on this point.

Mr. W. F. ENDEAN (manager, Middleton Electric Traction Company, Limited): Mr. Humphries has taken as his subject one in which I am particularly interested, because during the last three or four years it has fallen to my lot to have to deal with the joints of our system that have been hammered and dished, which is the usual development of a track of the age of the one I control. The company not having very much money to spare, it was necessary for us to find a scheme to overcome the difficulty which we were experiencing in as economical a way as possible. I have done some 2,000 or 3,000 joints, certainly over 2,000, and I claim to have achieved a certain measure of success. Mr. Humphries, in one of the paragraphs of his paper, mentions a joint recommended by Mr. Fitzmaurice, the permanent way engineer to the British Electrical Federation. That is the joint to which I refer, and I recollect that it was at Middleton that Mr. Fitzmaurice first saw this joint in use, and he thought so highly of it that he has recommended it since to the other federated companies. Perhaps it might be of interest if I shortly explain what we have done. I make no claim for it to be anything special, but it is, at any rate, a method by which a company which has not much money with which to overcome the difficulty can get the full life out of the rails before scrapping them. A previous speaker said that the ideal joint was no joint, but the unfortunate part of it is that we managers have to face the present position, that is, that the joints are there, and we have to cure them. What we do is this. Ours is a rail of English section No. 1, or very near it. It has a four-hole fish plate, and the joint is further strengthened with an eight-hole flat sole plate, with four bolts at each end, 11 in. and 15 in. from the centre of the plate. What we do is to take off the old sole plate, cut out the concrete underneath, and substitute a piece of inverted rail bored similar to the old plate. Suitable thicknesses of steel packing are interposed between the new sole plate and the rail ends, with the result that when we screw up the eight bolts the ends of the rails are thrust upwards sufficiently high to enable them to be filed perfectly flat and true, with a dreadnought file. The old concrete is broken up small and packed round the anchor plate. The interstices are filled up with hot limestone chippings, and the whole mass is then run up with hot pitch grouting of the usual consistency. I have had occasion to open out several of these joints since they have been put in, owing to subsidences of the road necessitating the rails being lifted, and in every case I have found the new pitch concrete had amalgamated perfectly with the old substructure, and that no movement had taken place in the slightest degree. Hence we can assume that the joint is, at any rate, much better than it was before. The six points of Mr. Humphries' paper which he gives as being ideal I quite agree with, and the method I have described particularly with regard to "c" meets the case perfectly, because he mentions it should stand hammering without fracture and also be capable of standing up to its work even if its substructure is washed out from immediately beneath it. The method I have described hermetically seals the joint, and no water can possibly wash out any of the substructure, as obviously water can find no lodgment and very soon dries out, so no pumping can take place there. With regard to arc welding, I have no experience of it. I was very much interested in the description Mr. Humphries gave of it, but I am more inclined to defer any opinion on it for a few years and see how the deposited metal on the rail joint wears, before passing an opinion on it.

Mr. H. M. SAYERS: Mr. Humphries' paper divides itself into two parts, *i.e.*, construction of rail joints for new work, and the repair of rail joints which have been dished, or suffered other wear. As regards new construction, I look upon a reliably welded track, *i.e.*, a track without joints, as an ideal, and I have sought earnestly for the process which would produce it. So far I have not been able to satisfy myself that there is a welding process sufficiently good to justify me in advising the people who have to find the money to adopt it. The first welding process which came to my notice was the Falk, and that was not really a welding process. Inspection of the work done, and of the method used showed that it was only casting a chair round the joint. It was stated that steps were taken to prevent metallic contact between the new metal and the rails themselves. The next thing was the Thomson electric weld, which promises good results, but it requires a large amount of apparatus, a long occupation of the track, and a heavy capital expenditure. I am willing to admit that the proof of the pudding is in the eating, and it is possible that the results obtained justify the cost. A good deal of tramway track in Liverpool has been welded by that process, and it would be interesting if Mr. Brodie can tell us how it has stood. Then came the Thermit; when I first heard of the Thermit process and saw some of the work done, I thought that really was the ideal joint and weld, and I nearly gave the Thermit Company some large orders. Some tramway men in this country speak very highly of the Thermit joint, and get very good results from it, but there are others who have had a percentage of broken joints. That must be unsatisfactory for the people who have pushed the Thermit process with great assiduity and industry, and I think it would be in their own interests as well as those of the industry to explain these unfortunate cases and show that the causes are known and avoidable. I speak as being a little disappointed, because I thought Thermit was the thing, but the doubts thrown on it by the cases referred to have influenced people who want certainty to withhold orders. The Tudor welding I do not know anything about experimentally, and should like information. I think Mr. Humphries' arc welded fish plate really goes to the root of the difficulties which have prejudiced other methods. The fish plate is an exceedingly good device for giving necessary vertical stiffness to the rail at the joint, whilst it remains tight. My view of a tramway track—whether it is an elastic track or whether it is a rigid track—is that it should be equally rigid or equally elastic at all points; if the joint is more rigid or more elastic than the body of the rail, failure is bound to result sooner or later. Where the principal member is cut right across vertically, its strength must be made up for as if it were a girder on a span too long for one-piece members. Mr. Humphries' fish plate gives the necessary continuous rigidity; but the fish plates and bolts add to the cost of the welded joint. The second part of Mr. Humphries' paper is the repair of damaged tracks. I have had unfortunately to right many dished joints in tramway track, and I have tried various methods. The method I have found to be the best is to crank the fish plate sufficiently to raise the dished rail above the adjoining rail, and then grind or file the joint until the heads are flush. To make a good job of that involves fitting the fish plate to the rail. That is somewhat expensive, but when it is done the joint is at least as good as a new joint and should have as long a life. Whether the filling up of the dishes with new steel, welded by oxy-acetylene gas or otherwise, will give a wearing surface amalgamated with the original metal can only be shown by experience. With new work I also believe in fitting the the fish plates to the rails, because there is an unavoidable variation in both rail and fish plate sections, and it is a rare thing to find the rails butting up to give an absolutely level joint. It is therefore often necessary to fit the fish plates, and it is always desirable to grind or file the joints flush. (Applause.)

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Mr. J. W. DUGDALE (general manager, Oldham Corporation Tramways): In thanking Mr. Humphries for his valuable paper, may I say that I have listened very carefully to the various remarks which have been made by the last two speakers, Mr. Sayers and Mr. Endean, and being an officer who has charge of a concern which has been allowed to run with very little repair being done to its permanent way, I can speak with some experience upon welding and also upon the inefficient state of tramway tracks. The amount of thumping joints on my permanent way—I have 23 miles of track—in 1911 was something alarming. The first section we took as a test was the Ashton Road; we had somewhere about 1,000 joints on that section; and were in the position of having 30 ft. rails. We cut off the ends of the rails and put in inset pieces, the work being carried out by the Tudor Accumulator Company. That was a very good way of doing the work. It has been in use for three years, and has given satisfaction in every way. We have only had one joint that moved, and that was owing to bad workmanship at the time. We then, in the following year, reconstructed a further length of that section, but in that case, instead of cutting off the ends on the ground, I commenced with four lengths of 60 ft. new rails, and I followed that by taking out the lengths of the old rails and sending them to a jobbing shop and had the ends there cut off; they were marked, the tie-bar holes were kept square, and they were returned and placed *in situ* as a follow-on. Now, that was quite all right on the straight road, but when I came to the curves, of course, by taking off a length of seven inches at either end, my curve radii were altered. We overcame that difficulty; we crowed that after we got the welding done, and that line is working very satisfactorily. We have another section with rails in their whole length of 60 ft., and we are welding those, you will surprised to know, with fish plate and Tudor welding. Perhaps Mr. Stutz will excuse me about the cheapness; I think that in a district where you have got colliery workings, a fish plate joint welded to the rail is the most satisfactory job, and after you have taken everything into consideration—the extra labour, the carting and one thing and another—I do not think it is any more expensive than a few shillings over the price of the Thermit weld. With regard to the thumping joints, taken as a whole, I believe that when the bumping or thumping first shows itself, a tramway man should at once go to that joint and open up the roadway and tighten up the nuts and bolts, similar to what is done on a railway. We in Sheffield did several joints like that immediately they showed bumping, and they were satisfactory. I had another section in Oldham; my men who were on the road reported that it was developing a bumping action. I set on a night gang and took out the paving, we tightened up the bolts, and, in some cases, put in new bolts, and then filed off the joint; that was two years ago and the road is still in good condition. I think we ought not to neglect the tightening up of the fish plate. I think there is something in it; expansion and contraction, of course, have got to be contended with. With regard to the remarks that have been made by Mr. Brodie, of Liverpool, I have been looking at that joint; it seems to me he must have a tremendous lot of work and pull to get this butt or these ends butted up. I would like to ask Mr. Brodie what weight he has to put on the come-alongs to pull those joints up to enable him to put in the eccentric bolts. Again thanking Mr. Humphries for his admirable paper, I also thank those gentlemen who have passed such instructive remarks upon it.

Mr. A. COVENEY (electrical engineer and manager, Erith Corporation Tramways): I will just say a word on the question of patching hollow places. I believe Mr. Sayers asked just now if anyone had any practical experience of patching holes. Someone remarked to me recently that I ought not to speak, because my system is only represented by a dot on the map—a dot on a 25 in. scale map—but I do, as I have some actual experience. I sincerely thank Mr. Humphries for what I consider is a very useful paper indeed. I am entirely in accord with his view that a welded fish joint is a proper course to adopt, particularly in regard to reconstruction work. I have had some joints done, and have had them at work for two or three years. When I received this paper from our secretary I caused a very careful inspection to be made of some welded fish joints, particularly where patching of the dish had been done, and although we had previously carefully noted where the dished joints had been dealt with, by identifying them either by a numbered pole, or so many yards from a numbered pole or house, it was impossible to find that patched joint without taking up the setts. There is absolutely no indication of scaling off or working out, or of any additional hollow before or beyond the place dealt with. The patched portion presents a perfectly clear and unbroken surface, exactly as the original rail presents in the centre, and I think that is quite satisfactory evidence. These joints have been done nearly three years. There is one immediately outside my office. I inspect it almost every day, and I cannot find anything that indicates the existence of a joint at that spot.

Mr. G. STRATTON (general manager and engineer, Sunderland Corporation Tramways): I am not in a position to give the Conference any great assistance in this matter. I am really seeking for information. I am just starting with bad joints, but I have got very few at present. The only thing is that I have opened out some fish plates, and tightened up the bolts, and I find that very beneficial, but they will not last any length of time. I shall have to be adopting welding or new joints, or something of the kind, very shortly.

Mr. C. J. JEWELL (resident engineer, Yorkshire Electric Tramways, Limited): I thank Mr. Humphries very much for his paper, which has been exceedingly interesting to me. On the system with which I am concerned—Wakefield Tramways—we had in the original construction concrete stringers, and during the time they were down, although only using ordinary fish plates and sole plate joints, we had no difficulty with joints hammering or coming loose. Last year, however, we made the concrete solid right across the track, and now we are experiencing the hammering and the usual hollows which follow. This we shall have to tackle at some future date. This experience gives me the opinion that the very slight flexibility due to the concrete stringer was sufficient to save the joints, and, if this is so, it serves to point out that to get a good joint it is either necessary to have an exceedingly solid arrangement such as a welded or Thermit joint, or an arrangement which gives a certain amount of flexibility such as we had with the concrete stringer. It has been very interesting to hear the various remarks made about electric welding, which shows that it is a very handy thing for track improvements, especially with a track that has started to go, but I do not quite know whether it will not prove too expensive and slow for new work.

Mr. W. T. ROBSON (manager, South Shields Corporation Tramways): The only remark I wish to make on these comparisons is the absence of any reference to the centre-groove rail, which has been used in two places, Hull and Doncaster, with extraordinary success, and it seems to me that it is quite worthy of some consideration in any comparison between English and foreign sections.

Mr. G. W. HOLFORD (general manager, Salford Corporation Tramways): I join in thanking Mr. Humphries for his paper, and if my experience is of any service to the Conference I shall be pleased to give it to them. We tried Thermit welding on old joints, we tried Thermit welding on new joints, and I can safely say that the welding of the old joints was not a success, nor do I think they would claim it to be now. With the welding of new joints, I disagree with Mr. Sayers when he suggests that there are a large number of failures. It is not so in our case, at any rate. I think the percentage is four per 1,000. We have had experience of the electric welding of old joints, not by welding on the fish plates, but by the method of the Tudor process, cutting out a portion of the rail and welding in a new piece of rail. These have not been down very long, so I cannot say what the result will be, but, according to several people's experience, we may hope to get four or five years' longer life out of the rail. We have six miles welded by that process now. We have 15 miles of track welded by the Thermit process—that is, new track. There are other joints, such as the Atlas joint, which Mr. Humphries mentioned in his paper. We have tried them for old joints, by raising the forward rail and fish plate and grinding down at that point; this has worked fairly satisfactorily, but I cannot say beyond that. There is another form of joint which was used in Sunderland—I think it was in Sunderland—of which we tried a few, and that was by cutting the upper portion of the rail away on each side of the joint, and then placing over the web, or the remaining portion of the web, a new length of rail, resting on the bottom flange of the rail. That we have tried in several instances, and after they had been down a short time we could not find the joints in the rail. But I do not think that any of these processes for old rails are as satisfactory as the one we are now trying, namely, the Tudor system. I have not tried the Tudor system on new rails, though I have been invited to do so, and I think it is quite probable we may try that method. I hope, if we do, our good friend Mr. Stutz will not be at all jealous, as I know he likes a fair field. I rather think Mr. Humphries was a little out in his cost when he said five shillings per joint. Does that include taking up the paving, the bed of the road, repaving, pitching, etc.? It seems to me that it is not a very high figure if it does.

The CHAIRMAN: I am requested to read the following telegram: "Very much regret received letters this morning absolutely imperative remain in London. Please express sincere regrets to members and Lord Mayor.—Arthur Stanley." We have had a very interesting paper by Mr. Humphries, and a very interesting discussion. I think the one point which appeals to us all, in the discussion especially, is that most of us have been looking out for some remedy to patch up a permanent way which is defective. As Mr. Sayers pointed out, Mr. Humphries' paper can be divided into two sections, construction and reconstruction. I think we have heard a good deal more about reconstruction than we have heard about construction. It is very difficult in the matter of reconstruction to know what to do. Many ways have been suggested, such as the Falk weld or the welding of fish plates, bringing up the rails level to each other, and grinding them down. These are no doubt all excellent in their own way. I myself have seen very excellent results that have been obtained therefrom. What I think we are more interested in, however, is to save in the future the unfortunate effects of working that we have seen in the past, and to try and put down some system of construction that will not require all these very excellent efforts of other people to try and remedy these defects that appear. What I suggest is that these defects ought not to appear, and we ought

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to use the whole of our energies to find some system of laying down rails whereby we can be assured that the joints will practically last as long as the rails themselves. Now Mr. Stutz, of course, is confident, he always is confident, he looks confident. We know that he has a great many disciples. Whether that is due to the fact that he is extremely energetic as a business man, and that he knows how to get round the various people with that nice way of his, I do not know. (Laughter.) I am not a convert yet, but then, perhaps, I am too old to be converted. We all admit that the Thermit is a very interesting, clever process, and I have followed it with great interest from the first day when I had the first opportunity, many years ago, of seeing the process in a little cellar in Victoria Street illustrated by Professor Boyes, I believe. That was before Mr. Stutz came into the world of tramway joints. Mr. Humphries' paper has dealt with the dicker joint, which we all know was a very useful joint in its way, and served a useful purpose for many years, of course, the disadvantage being that however good mechanically it was you never got the same rate of wear between rail and fish plate, and you got an uneven wear of surface, the fish plate being very often harder or softer than the rail itself. We then drifted into no special appliances whatever, and trusted to the best fish plate we could get and the best method of construction that could be adopted. I still believe, and I am going to maintain that after all, no matter what many say who are interested in the construction of tramways with special appliances for joints, that you have got to guard against one thing, and that is to prevent that rigidity which is used generally in tramway construction. If you take, for instance, the County Council mode of construction in London, you have an inverted rail which is riveted on the bottom flange of the running rail, that is let into a mass of concrete, sometimes as much as two feet in thickness. On the top of that joint you have heavy tramcars hammering at it every few minutes. Well, now, if anybody wants to make a good rivet head, he obviously puts the very best anvil he can under it to produce it, and it is the anvil here provided which is largely responsible for the dishing of the rails at the joints. That is what I cannot understand; that here you have got an evil, viz., your joints get dished, and you provide the best anvil you possibly can for the purpose of enabling that dishing to succeed. Therefore I say in tramway practice generally what we neglect is to try and get a road bed of the most elastic kind. When this is done, and proper fish plates provided and well fitted, I do not believe that these troubles which do occur will happen as often as they have in the past. I therefore recommend, as far as my experience goes, and advise all managers not to be led away by the charm of Mr. Stutz, or the Tudor, or anybody else, but to consider the question whether, as a real engineering problem, it is not better to follow the old example of the railways. We do not find dished joints on railways although there is no weld and there is no Mr. Stutz, but we do at any rate get a joint which lasts as long as the rail itself, and that is solely due, as we all know, to the fact that we have not got a rigid road under the trains. (Applause.)

Mr. R. HUMPHRIES, replying, said: I must be brief, because I am in front of a better man. Mr. Stutz, in his opening remarks, spoke of the cost of the welding that I had been explaining. We have been fortunate in the Black Country in finding some old boosters, that we have applied to our use, and our chairman, Mr. Hilton, whom we are delighted to have with us to-day, will support me when I say we are nothing in the Black Country unless we are economical. The welding car is an old car scrapped from passenger work—you will see it in the photograph. The operator, who is seen wearing a helmet, not only does the welding work when necessary, but also drives the car and does the hauling for the permanent way work. So I think we get down to as economical a proposition as we can possibly do. Now, I feel sure that a good many representatives of other companies whom I see here could, if they liked, look round their derelict plant and find boosters and generators which, with a little alteration, would come in for similar work. Mr. Endean (Middleton) spoke chiefly of the wear of the deposited metal on the head of the rail; well, gentlemen, that is not the chief part of my paper. The chief part of my paper is the welding of the fish plate to the rail. If you have a slightly dished joint, as I said in the paper, if you crank or arch the plate, as Mr. Sayers so ably put it, force up the slight dish on the head of the rail, and weld your plate as well to the rail, you will get an excellent joint without touching the top surface of the rail at all, If you have a dreadfully bad dished joint, you may have to cut out, put in a closure, and weld that. I thank Mr. Sayers for his laudatory remarks that I am on the right road; if I am not like the girl who took the wrong turning, I shall get to the right end. (Laughter.) His great experience is most helpful to me, because he has been here, there, and everywhere, and can speak with knowledge. The gentleman from Wakefield, Mr. Jewell, spoke of stringer concrete: I fear his trouble since reverting to the concrete bed has been the disturbance of the existing track, relaying I presume your old rails—

Mr. JEWELL: No; making it perfectly rigid.

Mr. HUMPHRIES: You did not disturb anything?

Mr. JEWELL: Only where it was bad.

Mr. HUMPHRIES: He is certainly correct in stating that flexibility is necessary. Mr. Tegetmeier will correct me if I am not right in stating that in Auckland even putting a creosoted sleeper transversely across under the joint dished a joint that was otherwise undished. Joints suspended as on a railway track ran silently until transverse sleepers were put across, and in some cases the mistake was made in not putting the joint in air; the sleeper was packed up under the joint, and the mere rigidity of that creosoted sleeper was sufficient in some cases to start hammering on the joints, which were otherwise perfectly silent. Mr. Holford, of Salford, spoke of the Atlas method of cranking plates, bending or otherwise altering the shape of the standard fish plate to suit worn track. I have touched on that in my general remarks on cranking plates. My figures in the paper were operating costs only of welding work, and had no connection with sett paving or any other part of the work. I simply gave those prices so that they could be compared with other prices that one gets for welding joints when one goes to firms who make a speciality of such work. You do not get in the prices given you the work of ripping out setts and replacing them; you simply get the work and the prices necessary for their portion of the work on the joint or track alone. There seems to be a feeling of one or two of the speakers that they are fighting shy of welding fish plates solid to the track on new work because it is only fit for reconstruction and repairs. I do not think they are right; we have to have a joint of some sort until we get a rail that is turned out by the mile without joints. We must have a joint, and if you do not weld your fish plate to the track in new work, what joints are you going to have? If we eliminate the weak points of the fish plate joint and make it solid to the rail we do away with creeping, we do away with the sagging or wedging action. I feel if we can get to that desirable condition of which our chairman spoke, of being absolutely independent of our substructure, that will be ideal—get really to railway practice. Until that date comes, I feel we cannot put up with a plain fish-plate joint. If we could do the same as in railway construction, and as with railway engineers, and daily tighten our fish plates, we should never have dished joints; but it is not our practice, and I feel we should be up against trouble if we attempted to do it upon our tracks monthly, end to end, and tighten our plates. We must do something which will prevent the plates getting loose. (Applause.)

Mr. Harry England, vice-president, having arrived, Mr. Sellon vacated the chair.

Mr. ENGLAND, on taking the chair, said: Before calling on Mr. Brodie for the next paper, I must just detain you for a moment while I apologise and express my regret at being unable to be present yesterday. Unfortunately, conferences are not fixed to suit the whole of us, and somebody must unavoidably be prevented from being present, and unfortunately I am among the number.

Mr. J. A. BRODIE (city engineer of Liverpool): Before going on with my paper, I should just like to say a word in reference to the last discussion. One gentleman asked me what was the Liverpool experience in the matter of joints. I think we have tried every joint which has come on the market, one after the other. The result is that to-day we have the eccentric joint, the Thermit joint, and the Tudor joint, all of which we look upon, not as perfect exactly, but as nearly perfect as we are likely to get within a short time. I should just like to say that I thank Mr. Stutz very much and also Mr. Burnet for the helpful way in which they have dealt with all the works at Liverpool.

[Mr. HAMILTON, of Leeds, who was unable to be present, has sent a contribution to the discussion, which is given on a following page.]

TOWN PLANNING IN RELATION TO TRAMWAYS.

BY MR. J. A. BRODIE

(City Engineer, Liverpool Corporation).

Your chairman, the Hon. Arthur Stanley, has, from the very earliest days of the self-propelled traffic movement, taken so keen and helpful an interest in all matters connected with the improvement of roads and methods of traffic generally, that when he honoured me with an invitation to read a paper before the annual Conference of the Tramways and Light Railways Association, I felt that I should, if possible, comply with his request. I, therefore, propose to deal in a general way with some of the points arising in connection with town planning and roads which are likely to affect, or to be affected by, the methods adopted for the local conveyance of passengers between the central areas and the districts likely to be town planned on the outskirts of the larger towns of this country.

I quite appreciate the importance of the relationship between improved means of conveyance and the development of town areas, as during the past 30 years I have been directly responsible for the construction of the horse tramway lines, and for their relaying and maintenance, and also for the design, construction, reconstruction, and

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maintenance of the electric tramway lines laid within the city of Liverpool. During the greater part of this time my work has also included the carrying out of all street improvements and widenings, as well as the construction of new wide streets, and the supervision of building estates involving the provision of new houses for approximately 150,000 inhabitants, all of which items form important portions of the work which is likely to come under the general heading now known as town planning.

The main streets and roads have always been the principal feature in the old plans of towns, and they must, I think, continue to form the real backbone and frame to which the details of any effective town planning scheme are to be fitted. The success and prosperity of any town has in the past largely depended on the facilities for traffic, and there can be little doubt that speedy local passenger transport is likely to play a very important part as affecting the development of town areas in the future. The principal lines of traffic in any large town, if reduced to a simple diagram, will generally be found to show a central area from which lines radiate to the outskirts as directly as the physical features of the area permit. At distances from the centre subsidiary lines for belt traffic are required, and if properly planned in advance, they can be utilised to assist in reducing the further congestion of the central area. Such a diagram of Liverpool and its immediate surroundings is shown, and it will be noticed that the River Mersey forms an important interference with the lines of the diagram in a westerly direction, whilst the steep hills encountered in the direction of Everton, lying to the north-east, have hitherto prevented any direct approach through this important and densely-populated district to the undeveloped land which at this point is nearer to the central area than at any other.

The history of street improvements in England shows that up to the passing of the Town Planning Act, 1909, no general powers existed in this country for the purpose of effectively dealing with street improvements, and practically no variation or improvement of the line or direction of any proposed street, however important, could be introduced, except by agreement with the landowner, without first obtaining special Parliamentary powers for each particular work. Immediately outside the town boundary matters were worse still, for here the control was in the hands of the small local authority who had not the means to carry out improvements on any proper scale, and Parliament refused to allow the large authority to have any voice in, or to help improvements outside its boundary, without first obtaining special Parliamentary powers. If the intention of Parliament had been that it should be made as difficult and expensive as possible for public authorities to arrange for satisfactory main lines of communication within and outside a town, then the old powers were certainly well arranged for the purpose. Some small districts still continue to follow the old line of policy, and even county authorities, who might be expected to take a larger view of the position, have supported them; but fortunately many such authorities have taken a more reasonable view, and in the neighbourhood of Liverpool the councils of four large areas lying to the south of the city recognised that they could not deal with the question of town planning on a suitable scale except at, for them, great expense, and these districts have been included by agreement within the city, on the understanding that proper schemes are to be prepared, so that there is some prospect of dealing with the southern section of the extended city on proper lines.

In the year 1867 the town of Liverpool made a very complete enquiry into the necessity for improving the main thoroughfares, and proceeded to Parliament for powers to carry out street improvements involving a cost of £700,000, but many of these schemes have not up to the present time been carried out. Amongst the schemes submitted at that time by the then borough engineer, who was remarkable for his foresight, was one for the construction of a boulevard road, 180 ft. wide, commencing south of the town at the river, passing round near the then eastern boundaries and ending at the river to the north of the town. Such a road would have been of immense advantage to Liverpool, and to this country as a good example, and could have been carried out at a cost less than the expense of widening one mile along its route at the present time to a width of even 60 ft. As the result of want of powers, combined with want of foresight, many additional roads of much too narrow width have been added in town areas in England, and though about four millions sterling have been expended in Liverpool during the past 50 years, it can safely be said that none of the most important streets in the old part of the town are of a width in excess of present requirements.

It cannot be said that in any of our English towns heavy expenditure on such improvements is at an end. On the contrary, it is probably not far from the truth to say that a new era of road improvement and widening is about to commence, and it is, therefore, specially important that attention should be given to this section of the subject. Experience in connection with street improvements near the centre of the town shows that about four-fifths of the whole expenditure goes in payment for houses and compensations, all of which would have been avoided if care had been taken to see that ample width for traffic purposes had been originally provided. In 1908 Liverpool obtained a special Act which gave power to the Corporation to control the widths, direction, and gradients of all roads likely to become main lines of communication, and either by negotiation or under the powers of this Act about 20 miles of roads varying from 72 ft. to 120 ft. wide have been constructed as new roads or as widenings of existing roads, principally on the outskirts. The powers contained in the Town Planning Act of 1909, if properly exercised, will also be of immense advantage in connection with the provision of main roads, and some of the points which are likely to have a most direct effect on local traffic conditions are, shortly, as follows:

(1) The planning of new areas likely to be developed in the outskirts, and construction of main streets and roads through them.
(2) The replanning and rearrangement of the older and congested areas in towns and the rehousing of the displaced inhabitants.
(3) The reduction of the number of houses to the acre.
(4) The purchase of land for housing schemes.
(5) The provision of open spaces, parks, recreation grounds, etc.
(6) The allocation of areas for industrial purposes.

When these points are looked into from the purely surface passenger traffic view it will be seen that, whilst the four latter may have some effect on the amount of traffic likely to be provided, the really important points are those connected with the planning and provision of the main streets and roads whether through new or old areas.

An interesting question which arises in this connection is: At what distance apart should such main lines of communication be provided? So far as I can find out no standard on the basis either of distance apart, of population served, or of most economical headway between vehicles has been arrived at, and it appears very desirable that more accurate knowledge as to the population served by any line of tramways should be available. The want of knowledge arises no doubt from the fact that hitherto tramways have had to follow such main roads as existed, but if really careful planning is to be adopted these points may require to be more carefully looked into. The average distance apart of tramway lines at the approximate limit of the closely built-up area in Liverpool may be taken at about 800 yards, the average number of houses at this point being about 25 per acre, and the average walking distance to the nearest stopping place being about 500 yards.

In the case of Liverpool the town planning of the whole of the area lying to the south of the built-up area and within the city boundary is at the present time under consideration, and there are now lines of tramways which run through these areas. In these districts it will probably be found that tramways will be required, when the buildings are developed, at a maximum distance apart of about 1,000 yards, but this will depend to some extent on the number of houses allowed to the acre and other conditions, such as the amount of ground allotted to playgrounds and parks. It will be understood, however, that there is likely to be considerable difficulty in foreseeing what may be the requirements for portions of these districts which may not be fully developed for possibly 40 years. Other questions which arise are:

At what distance apart should stopping places be provided on a well-designed system of tramways?

Are travelling facilities likely to be of such importance in the future that stopping places should be taken into consideration when laying out the internal planning of the areas lying between traffic roads?

If so, should the positions of subsidiary cross roads be determined by the best position for stopping places?

Or may these points be left to chance as hitherto?

A very considerable change has occurred in connection with all forms of street traffic since the introduction of the self-propelled vehicle. Ample width in the first instance is now a matter of the greatest possible importance in all main thoroughfares where the general traffic is likely to be considerable, and 80 ft. may be looked upon as the minimum width which should be adopted in any important main thoroughfare leading towards the centre of any considerable community. It has been argued that 60 ft. is quite wide enough, but very few people who have themselves felt the strain of fast driving through traffic will endorse this view. It has also been pointed out that widening to 80 ft. is unnecessarily expensive, but it is found in actual practice that there is no very considerable difference in cost when the extra width does not involve additional frontage properties or render the surplus sites so narrow as to be unsuitable for building purposes, as the compensation payable for disturbance forms a very important item of the expenditure. Where land can be acquired on reasonable terms, as in the outskirts of a large city, the widening of the most important main thoroughfares to 120 ft. can be strongly recommended wherever the street authority and the tramway authority are anxious to provide the best possible accommodation for traffic, and are prepared to work together with this object in view

The design of the surface of such a roadway is of itself an interesting problem, and I have pleasure in referring to two typical sections of roadways which have been constructed in Liverpool, having widths of 114 ft. and 120 ft. respectively. In the cross sections of these roads it will be

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seen that tramways have been laid down the centres, both roads being radial roads leading toward the centre of the city. In the 114 ft. wide road it was found to be inadvisable to lay the tramways in grass, as this would have had the effect of reducing the amount of room left available for ordinary traffic unduly. The tramways in this case were, therefore, laid on longitudinal concrete beams, and the surface finished in pitch macadam. In the case of the 120 ft. wide road, the tramways are laid on wooden cross sleepers on a clinker foundation, the clinker being brought up to the level of the top of the sleepers, and over this soil is laid for grass, the top of the soil being left at the level of the bottom of the head of the rail. The roadways outside the tramway track, where new, are being laid with a clinker concrete foundation with macadam stone embedded in its upper surface, and the wearing surface of these roads is finished in pitch macadam, the traffic expected along this route, though considerable in quantity, being generally of fairly light type.

The arrangements made in regard to the 120 ft. wide road have been of such a character that the total cost of constructing the tramways and additional street surfaces can be carried out, as shown on the cross section, to the full width of 120 ft., without any greater cost than would have been necessary to provide for a street only 80 ft. wide with tramways of the usual construction and paved complete. The cost of construction of a new tramway in Liverpool, including excavation, concrete foundation, permanent way, and paving of the highest class, may be taken at about £6,000 per mile of single line, exclusive of the overhead equipment. On taking out estimates for the simplest form of construction of tramways, which included crushed clinker foundation and ballast, the tramway being laid on cross sleepers and the surface finished in grass, it was found that the cost amounted to about £3,000 per mile of single line exclusive of overhead equipment, thus showing a saving of approximately £6,000 per mile of double line of route. It appeared, however, that such a track could not be laid and safely worked at a high speed, bearing in mind the other vehicular traffic, on a road only 80 ft. wide, which was the width originally intended by the street authority. As the land adjoining a portion of this road, amounting to nearly two miles in length, could still be acquired for less than 5s. per sq. yd. on the average, including all compensations, it became feasible, with the difference in cost of tramway construction between the two methods, to purchase a strip of land 40 ft. wide throughout this length, and on a careful consideration of the estimates the tramway authority agreed with the street authority that the road should be constructed to a width of 120 ft. The tramways are being constructed in the centre of the roadway, this area being fenced off from the general traffic by low hedges, and in this way any trespassing on the line will be avoided, and it will be possible for the tramway to run safely at any speed which may be authorised. The tramway undertaking will also have the benefit of the reduced cost of maintenance which the absence of the necessity for removing the paving when repairs or adjustments are required will allow.

The question naturally arises whether such a road will completely meet the requirements of fast services for local passenger traffic, and, if so, how far in the direction of the centre of the town it is possible to carry a wide road of this description, bearing in mind the cost of land and compensation?

The types of area which have to be dealt with may be divided roughly into four classes:

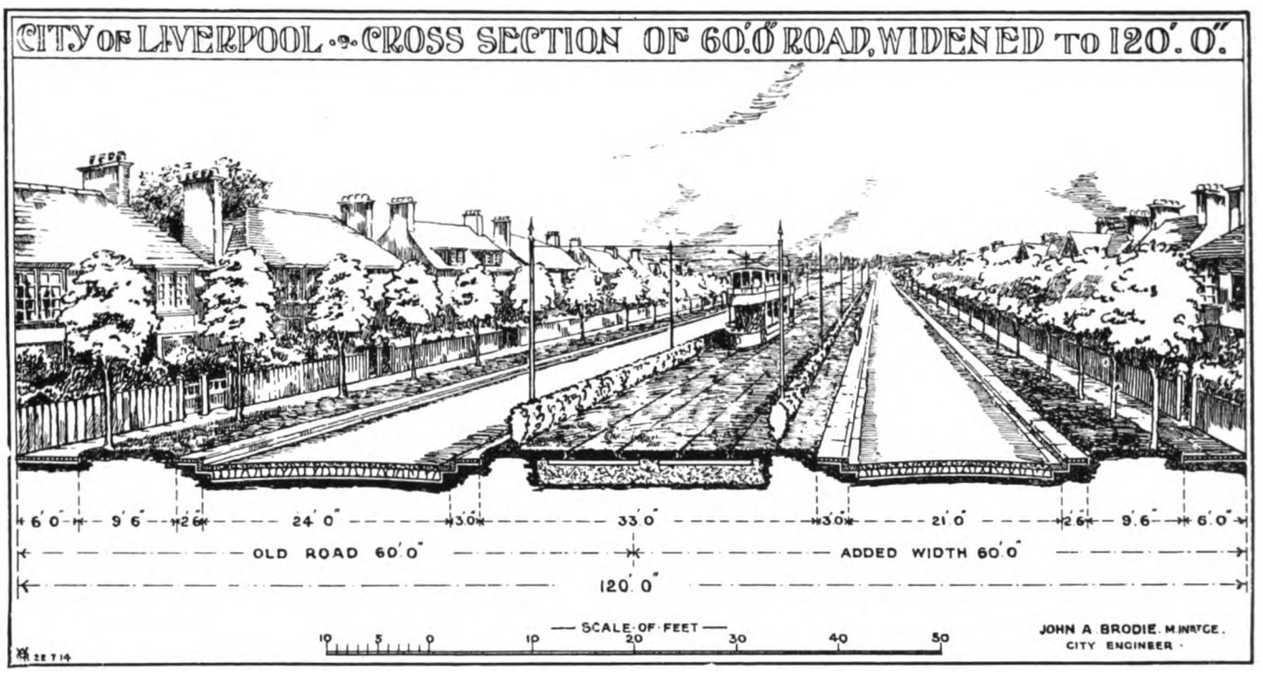
(1) That already described in the preceding remarks in which the cost of land and compensations does not exceed on the average 5s. per superficial yard.

(2) An area consisting of portions partly built up with unbuilt portions, gardens, etc., which would bring out the cost on the average to about £1 per superficial yard for the land required.

(3) An area still nearer town where the buildings have probably approached the limit of their life which it may be necessary to deal with when rearranging and rebuilding so that it may be brought up to an up-to-date condition; where the cost of the necessary land for widening would approximately be £5 per superficial yard.

(4) An area lying in the immediate vicinity of the central area through which the cost of widening roads will be a very considerable item, and where the cost of the necessary land for widening would be approximately £25 per superficial yard.

On the basis of the cost of land given in these foregoing classes, estimates have been taken out, it being assured that where the road is widened to 80 ft. reconstruction of the whole surface will be required, whereas when widened to 120 ft. the existing roadway for 40 ft. will not require reconstructing. The total cost per mile of the respective classes of roads may be taken roughly as follows:



Class 1.—40 ft. road widened to 80 ft., with paved tramways, £29,000 per mile. If widened to 120 ft. with tramways in special track in grass, £26,000 per mile.

Class 2.—40 ft. road widened to 80 ft., paved throughout, plus tramways, £53,000 per mile. If widened to 120 ft. with tramways laid in special track in centre, £65,000 per mile.

Class 3.—40 ft. road widened to 80 ft., paved throughout, plus tramways, £147,000 per mile. If widened to 120 ft. with tramways laid in special track in the centre, £252,000 per mile.

Class 4.—40 ft. road widened to 80 ft., paved throughout, plus tramways, £616,000 per mile. If widened to 120 ft. with tramways laid in a special track in the centre, £1,190,000 per mile.

The figures quoted may be taken as the cost of average roads without specially difficult works, and it will be seen that they compare advantageously with the cost of shallow subways or tubes which may in certain favourable cases be constructed as low as £300,000 per mile, but for which the usual estimated cost where passing under property is taken at an average of about £500,000 per mile; and it must be borne in mind that the wide roadway will be of much advantage to the town both in assisting in the replanning and reconstruction of parts of the old areas and in providing new frontages, improved rateable value, and greatly improved conveniences for the conduct of the general traffic, none of which objects would be directly assisted by the construction of subways or tubes.

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The question will naturally arise as to how the cost of such wide roads is to be apportioned between the street authority and the tramway and other authorities respectively. In the case where the municipality controls all interests it should not be a very difficult point to settle, as the tramway authority usually contributes towards the reduction of the rates, and the rates bear the interest and sinking fund for the improvement expenditure. It probably would have led to better results, from the point of view of the travelling public, and particularly from that of the tramway authority, if their contributions towards the rates had been specially earmarked to be used only for the improvement and widening of tramway streets.

Tramway traffics are likely to suffer severely in the future from the neglect of road widenings in the larger towns of this country, and, though large expenditures will no doubt be required in connection with local passenger traffic, with the object of providing faster services, such expenditures should be carefully looked into with the object of seeing that these expenditures should be carried out to the best advantage.

I now propose to leave the question of wide roads and deal with some of the questions affecting the future of tramways. My own experience of tramways and tramway work extends over a considerable period, and it may be, therefore, that I am unduly prejudiced in favour of tramway systems. I have, however, followed very closely the various developments of the other means for the local conveyance of passengers at present practicable, and I have come to the conclusion that there is, at the present time, a fine opening in many places for an improved tramway system, if designed and carried out on lines calculated to meet effectively the other forms of conveyance at present successfully competing with existing tramways. Of course, in arriving at this view, I am assuming that those responsible for tramways will take full advantage of every development both in materials and methods, and that there will not be too great reluctance to move with the times.

The main factor leading to success, in my opinion, will be speed. It is, indeed, unfortunate that too narrow and conservative a view has been so generally taken of the advantages likely to accrue to local passenger traffic from road widenings and improvements. If any considerable proportion of a surface tramway route is laid along a street upon which, owing to the interference of other traffic, the lack of sufficient widths, awkward turns, or for other reasons, an average speed cannot be maintained which will enable it to compete successfully in the matter of time with other systems serving the same area, the surface tramway system though, to-day, holding pride of place in this country as a means for the local conveyance of passengers, is hardly likely to retain that position. Speeds averaging from 15 to 25 miles per hour are already being given on systems having special tracks not interfered with by level crossings, where operated by electricity, and, though a considerable loss of time is usual, by reason of the difficulty of approach to the stations and the somewhat inconvenient distance apart of the stops, some of the districts served by such systems are already withdrawing residents, who, whilst formerly content to reside in town and at a distance of two or three miles from the centre, to use the surface tramway system, now find it possible to reside outside the city at a three times greater distance from their business, and under pleasanter conditions, with the added advantage of being able to return home in the luncheon hour, if they desire to do so.

The individual who rides in a motor car or taxi cab expects to be carried even through town streets at an average speed equal to the present maximum speed limit, and, if it has not already arrived, the time is not far distant when the present maximum limit of speed on public roads and streets of 20 miles per hour will become the average speed, and it is, therefore, hardly likely that local passengers will for long be contented with an average speed of about eight to 10 miles per hour. It is, indeed, difficult to see why the ratepayer in, at any rate, the better quarters of a large town should remain content with an inferior service if he is prepared to pay the slightly increased fare which would probably be necessary to provide him with a service giving greater comfort and speed.

Increased speed has come to stay, and both the town planning and tramway authorities must be prepared to provide arrangements which will meet the new conditions of life in large towns. Combined with speed there must be (1) safety both for passengers and for the other users of the road; (2) comfort for passengers and for the occupiers of frontage property; (3) reasonable economy. From what has already been said it would appear that the average speed should be increased to the neighbourhood of 20 miles per hour, though owing to the convenience of surface systems and the greater number of stops a lower speed would probably compete successfully. It is likely that stops would average six to the mile, as against about one stop per mile in the case of trains and two stops per mile in the case of tubes, overhead railways, etc. Safety can be provided for in the case of fenced-in lines laid on wide streets, as the public and other traffic is excluded between stopping stations, and at stations the speed is of necessity reduced.

Where, owing to the narrowness of the roads, a fenced-in track cannot be provided, a good deal could still be done by the street authority for the additional safety of fast traffic in main trunk thoroughfares by dealing with the junctions of side streets in such a way as to slow up any traffic coming into the thoroughfare from them. Such an arrangement could be made use of to prevent such traffic coming in on the wrong side or otherwise carelessly. Where, as in most cases, the buildings are brought to a square corner on a narrow main thoroughfare, it is practically impossible for the driver of fast vehicles to prevent collision with a driver coming in carelessly or quickly on the wrong side from an unimportant side street.

The tramway vehicle and the standard track have for a considerable number of years not been much improved, though credit should be given for the weld and other improved joints, which have had an excellent effect in reducing the shock and jar to passengers whilst passing over faulty joints, as also in reducing the noise and inconvenience suffered by frontagers living on most of the routes. It can hardly be said, however, that even the most perfect tramway system adds to the enjoyment of frontagers, and many cases occur where houses are emptied, particularly in cases of continuing illness or nervous worry.

If speeds are to be increased, as appears to be necessary to enable tramways to contend successfully with other forms of passenger conveyance, the question of noise and vibration must be as far as possible eliminated. In the case of other road vehicles the problem has been successfully solved by the introduction of the indiarubber tread, and though the application of the indiarubber or other resilient and silent tire to tramway vehicles would without doubt introduce some new and difficult problems, these are not incapable of solution by competent engineers, and it appears to be remarkable that such a comparatively simple solution of some of the problems which have been troubling tramway engineers should, so far as I am aware, not have been successfully experimented with. The addition of some form of rubber tires to tramway vehicles would no doubt slightly increase the working costs, but it is likely that the life of properly-designed tires would much exceed the life of tires on motor omnibuses or motor wagons, on which a life of 20,000 miles and over is quite common. It must be remembered also that the addition of indiarubber tires to the wheels of motor wagons using somewhat roughly-paved roads and streets has now been warranted by economical results. The wear on the rail surface would undoubtedly be much reduced, the cost of maintenance largely eliminated, and possibly the corrugation problem would sink into insignificance.

The other important point in connection with comfort and quietness which still, in many cases, requires attention is the noise of the gears very commonly used. In the case of motor cars, the noise of gears, at any rate in the case of the direct drive, has been practically eliminated, and though this may not in tramcars be a serious source of inconvenience to passengers at the present time, it is in many cases a great nuisance to residents on the line of route, and if quieter tires came into general use noisy gears may well form a continuing cause of complaint, which should, if possible, also be eradicated. It can hardly be expected that high speed and more luxurious riding will lead to much greater economy in operation as compared with the present day slow traffic. There does, however, appear to be an opening for tramway vehicles with a reduced proportion of weight per passenger carried, and lessons may well be learnt from motor vehicle construction, which has become quite an art, and in which special and expensive materials are largely used for the purpose of reducing the weight to be moved. Motor omnibuses capable of carrying 34 passengers are being turned out at a weight of 2 cwt. per passenger, as against about 3·5 cwt. per passenger in the case of tramcar construction.

With regard to the track, economy in first cost and subsequent maintenance is likely to be secured wherever the track can be separated from the ordinary road traffic; but where the lines are laid in the ordinary carriageway both first cost and maintenance charges are probably now at a minimum, wherever first-class work is done and the very best materials are used. In the case of Liverpool our standard Welsh stone pavement on a concrete foundation has withstood the ordinary steel-shod traffic for periods exceeding 30 years, and in some cases exceeding 40 years, while costing 6d. per superficial yard for genuine repairs within that time. The repairs of such a surface may, therefore, be taken as a negligible quantity. So good, in fact, was the paving material in Lord Street which was put down in 1877, that when the cross sectional levels of that street were altered last year the setts which had been down all that time were again used for repaving the street. It is, therefore, evident that the question of the cost of repairing streets within tramway limits, and the proportion chargeable respectively to the tramways and street authorities are in some cases misunderstood or slightly exaggerated, and in this, as in most other cases, there are two sides to the question.

I have endeavoured to deal with the subject of town planning in relation to local passenger traffic on lines which, though specially applicable to tramways, can, I think, with slight modifications, be made suitable for any form of surface transit. Width of roadway is of essential importance to safety if speed is to be permitted on the surface, and should it at any time in the future become necessary to provide for express speeds tramways in cutting could readily be provided in such portions of wide roads as may be thought necessary or advisable at a minimum of expenditure. Schemes for the town planning of large areas on the outskirts of our principal cities and towns are under

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consideration and preparation. In many large towns areas already built up will have to be rearranged, rebuilt, and housing schemes undertaken either by the municipalities or private parties. Large expenditures on the improvement of roads and streets giving access to the centre of the various cities will have to be incurred.

Important schemes for the improvement of local transport and means of conveyance are likely to be considered either by the municipalities or other large bodies, which will also involve very large expenditures. If the position of matters of such vital importance to large communities in this country is as I conceive it to be, then it appears extremely necessary that the whole of these expenditures should be carefully and broad-mindedly gone into, with the view of obtaining the best possible arrangements for the benefit of the general community, as well as of the special interests of each of the separate authorities involved.

Advantage should be taken wherever the conditions surrounding a route appear specially favourable to experiment with improved systems and arrangements. In this way much valuable information would be obtained, and experience so gained would enable a sound decision to be arrived at in the case of other routes where the conditions as to expenditure or otherwise appeared to be less favourable. In concluding my paper, I do not think it necessary to make any apology for bringing the subject matter before this important Conference, though I regret that the other demands on my time have prevented me from dealing as fully and thoroughly with the subject as I think its importance demands. I trust, however, that a number of points may have been raised which will give some food for thought, and also contribute to a lively and interesting discussion.

THE DISCUSSION.

The CHAIRMAN: The paper is now open for discussion. The paper raises not only the question of wide roads, but also the question of types of construction, and I hope that speakers, when they address the meeting, will bear that in mind.

Alderman F. SMITH (chairman, Liverpool Corporation Tramways Committee): I would not have risen so soon but for the fact that I think we are very much indebted to Mr. Brodie. Now, I regard Liverpool as a very good place. All men coming from Liverpool are very good—(laughter)—but, perhaps, you may have too much of even a good thing. Mr. Brodie has set a good example in summarising instead of reading the whole of the paper, and I think members ought to read the papers at home. Mr. Brodie is an autocrat, as you saw when he would not even allow me to shake my head when I objected to his method of preventing us from giving money to the rates. But I will tell you what we have done. We have liberally helped him from the tramways to do some of the work that he now puts before you, and I think he has touched the spot when he says it is necessary that tramways should have speed. You cannot get that speed unless you have wide roads, and I believe that there is a better feeling in regard to widening roads than there was a few years ago. I think they will have to be extended. I do not believe for a moment that people ought to travel in tunnels if they can have proper approaches to their towns through wide streets. I look with very great interest on the very able efforts Mr. Brodie has been making in Liverpool, and I hope that a valuable and useful discussion will take place upon the points which he has presented to us.

Alderman H. LINSLEY (Salford): I regret I am not able to accept your invitation, Mr. Chairman, to speak, as matters in Salford are not sufficiently far advanced to enable me usefully to say anything.

Mr. F. COUTTS (general manager and electrical engineer, Paisley Tramways Company): This paper has been rather interesting to me, although I am the representative of a company, and we have no concern whatever in regard to town planning from the same point of view as a municipal corporation. The point in Mr. Brodie's paper which struck me as being most attractive was the ideal system he put forward with the 120 ft. wide road scheme. The difficulties that present themselves to me are the cost. No doubt the wide road with the double running road is an ideal method of getting your traffic along, because we all know that with one road say of 45 ft., the traffic all sticks to the crown of the road, very few vehicles using the side, and there are only two lines of traffic instead of four as provided for here. However, you have the difficulty of the fast and slow moving traffic, and as there is not sufficient width in the 24 ft. road to allow of four abreast, I think it is desirable to make provision to have four abreast if it is at all possible, in order that the fast traffic can get round the slow. We all know as tramway men how we are worried by carters, how they will try to hinder tramcars, and the prejudice prevalent at the present moment, especially against the motor car, has made it very pronounced of late. The carters make themselves a nuisance, and if they can they will hang up the traffic as much as possible. The idea of a grass plot placed along the middle of the tracks is a very pretty ideal for the public to look upon. I have two miles of hedged track running through private grounds, and running alongside the main road, but to set grass on that track would be utterly impracticable; our great difficulty is to keep the grass from growing, as we have to pack those rails not less than once every four or five months. That track was laid beautifully; we were complimented on it by Colonel Yorke, who at the time of inspection said it was the best piece of construction for a private tramway he had seen. The whole bottom was hand pitched and the sleepers packed with clean new whin ballast, and every three or four months we had to go and repack it until we got it in its present condition, which now only requires repacking all over about once a year. I cannot well see how grass can be got to grow on top of whin ballast, and for earth to be mixed up with the metal would mean disaster. Mr. Brodie has had a large experience in all regular tramway construction matters, and I thank him for his extremely interesting, useful, and suggestive paper.

Mr. H. R. HOGG: I rise with some diffidence, but I think every inhabitant of any large town has to thank Mr. Brodie very much indeed for the attention which he has given to this subject. It is a subject which to-day is of very great interest to every town dweller. In England the towns have gradually grown up, and we have a number of very narrow streets in them. These served very well for the original state of things, but at the present day the circumstances have altered; and you now want larger main thoroughfares, which were not necessary when the towns were laid out or were gradually developing. I have lived a good many years of my life in a new country where a town is laid out long before it is built. These towns and townships, nearly all of them, have some very wide streets leading up to them. In the early days they had to drive cattle into the towns, because then that was the only way of disposing of them and selling them, but after some little time that all became obsolete, the cattle came by rail, but the roads remain. I am speaking of Victoria and New South Wales; there these wide streets remain, and for a long time they were a very serious charge on all the municipalities. Very wide streets, as you may imagine, before they are made up become perfectly intolerable from the dust. After you begin to make them up the cost of macadamising becomes a very serious matter indeed. A 200 ft. road has to be divided up into sections in much the same way as Mr. Brodie has done. I think his experience will be, when he has been able to try these wide roads, that a 90 ft. road is about as much as even a large town can provide going through its midst. It gives you quite sufficient room for a tramway down the middle and for plenty of traffic both ways at the sides. There is not the great expense of putting down blocks over a very great width, and it gives room for wide footpaths as well. If you have several of these 90 ft. roads they will, I believe, even in the most crowded towns, take all the traffic very much more easily than one that is wider, say, even a 120 ft. road. The expense of keeping up the wider road makes all the difference, and, of course, one has to think whether, where a town was laid out originally well, the town can stand the cost in two or three years' time. I believe it is really cheaper to wait till you do want the wide roads before you make them. Of course, it is a very costly thing in large towns to pull down houses, but I do not believe that the final cost of even widening your roads in that way is more than the cost of keeping them up for a number of years when it is unnecessary to have such wide roads. I make these remarks merely because it is a subject of great importance, though I have not had in practice to deal with roads myself.

Mr. S. SELLON, M.Inst.C.E.: I only want to make one remark, because, after all, with town planning I have practically nothing to do. The only interest I have in town planning is that anything which provides decent roads and enables a quick service to be maintained is obviously important to me from a tramway point of view. There is one question I should like to ask Mr. Brodie, and it is this—Why in the sections he has been good enough to give us, he has never contemplated putting the tramway on the side of the road? One of the greatest arguments in favour of that course is the advantage that is claimed for the motor omnibus, *i.e.*, that it can deposit all the passengers on the side of the road at will, whereas the tramway car is forced to maintain a rigid position, due to the rails on which it has to run. Now, this is a departure from what we see abroad; it is a departure from a principle which has been adopted, as we all know, probably in Vienna, Budapest, and other places, where the road is in the centre, then there is a fringe of grass, then you have the tramway, and finally the footpath. It seems to me that perhaps under those conditions you get more ideal town planning in constructing wide roads than you do in any other case, because you have enormously economised the cost of maintenance of your tramway by keeping off the ordinary road, and you are able to deposit your passengers on to the side of the footpath instead of making them cross the road unnecessarily. The only other observation I have to make is that I think Mr. Coutts must have been desirous of pulling Mr. Brodie's leg, for some reason I do not know. Why the grass should not be allowed to grow on a track I do not know. I have constructed a good many tramways and light railways on the sides of roads, and my difficulty has often been to keep the grass properly mown and looking respectable, the idea being that once having laid a track down on proper sleeper construction it does not require anything more than a gardener to go over it occasionally to keep the vegetation from growing. Therefore I should like Mr. Brodie to tell us his reason for departing from what I consider the best practice on this question, *i.e.*, the Continental practice.

Mr. F. BLAND: I think this is a matter which interests everybody,

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whether manufacturers or managers, but there are two matters which have struck me while I have been looking at that plan. It reminded me of the picture house where we went yesterday afternoon. We there saw how the boy dreamed awful things. It strikes me that some of our friends here when they go home will dream of these roads for two or three nights, and perhaps they will also dream of aeroplanes driving tramcars off those streets. It all opens a vista for us to look forward to. Another matter which I should like to mention is this. I understand there are powers in the Housing and Town Planning Act for the re-building and rearranging of old and congested areas, the destruction of houses, and, I presume, the rebuilding. I think it would be a very good thing if we could pay some attention to the type of building. In Sheffield we have just started town planning, under a very good city engineer, and at present we are making improvements in the matter of the roads, but I think some of us would be very glad if there could be some reconstruction or control of the type of houses to be put up to beautify, or spoil, as the case may be. At the present time much building is being done with every man his own architect, with the usual results. I think there ought to be some regulations to deal with that matter and to pevent improved areas being spoilt by all types of building. I thank Mr. Brodie for his very interesting paper.

Mr. W. J. STEELE (Newcastle): Mr Brodie has laid down these bold plans on a very sound principle. Mr. Hogg gave us his experiences in the Colonies, and whilst very sound from his point of view, I do not think what he says quite applies to England. Mr. Brodie is attempting to avoid the mistakes made 100 years ago. If you read the figures in his paper they show at once the necessity for these broad avenues. Every town of a large size has had the same experience as Liverpool in the enormous cost of widening roads in an old city. His experience has been confirmed by that in Newcastle. If roads are planned of ample width before development takes place, the cost is about one-tenth that of widening an old road, because at least three-quarters of the cost of widening an old highway in a town, particularly in the centre of a town, is due to the payment of compensation for pulling down property and other interests. With regard to the suggestion that has been made that in some towns you can get over the difficulty in widening existing highways by making tubes, I think that is unsound. I should imagine that 99 people out of 100 would prefer to travel overhead rather than underground. Underground roads, whether for trains or trams, are only necessary or desirable when there is absolutely no other way out. It may be necessary to have them to a certain extent in London, but generally speaking they are not economical. Mr. Sellon raised a point that has occurred to me, and I think it has occurred many times to Mr. Brodie, *i.e.*, that of making the trams run along the side of the footpath in the same way that a railway runs alongside a platform. That view appears correct when we imagine that a tramway is only a miniature railway, but a tramway service is different in this way; a railway has long distances between stops and passengers have not to cross a railway on the levels. If a tramway on a highway is laid alongside the footpath, we are defeating the very object Mr. Brodie is aiming at, and that is, fast travel. By making the tramway in the centre, remote from the junction of cross roads, it gives the cross traffic a chance to observe the coming traffic. If a tramway is laid alongside the footpath the risk of accidents is increased. There is a tramway laid on the system shown in the bottom section between Ostend and Blankenburgh between hedges, and the passengers can get up and down quite easily all the way and without delay. I think that is a right principle. Then again, if the tramway is laid alongside the kerb, and a person on the left side wants to get into a car on the right side, he has to cross the whole width of the road instead of only half-way. If the tramway on the North Road in Newcastle had been laid on the town moor, the necessary land could have been obtained at a very small cost by arrangement with the local bodies; the service could have gone at double the speed it does now. It would have been infinitely safer and much more convenient. Now there is another point with regard to this—what are termed quick roads and by-pass roads. There is, I think, in London a great scheme for making a by-pass road, and several towns, Liverpool in particular, have adopted the ring-road idea very largely in town-planning schemes. But I should like to have Mr. Brodie's opinion upon the real principle of the ring road, for this reason—if a man is in a motor car and he is travelling from another town, he does not always want to take the ring road, he wants to go through the town, he wants to see the town, and therefore the object raised by the ring road would be defeated by the inclination of the person who is travelling. That is one reason why I think the question of a ring road requires careful consideration before it is decided upon; whether it will really be used. If we are going to have this traffic with a speed of 20 miles an hour it will not only be a question of making these roads, but the whole of our laws relating to traffic on the highways will have to be modified. It will not be only a matter of roads, but the traffic will have to be regulated and perhaps fast through traffic compelled to go outside the centre of the cities. Whether that will ever pass an English parliament I do not know, but I would like to hear Mr. Brodie's opinion on that, because I know he has given great consideration to all these details.

Alderman G. J. ALLEN, J.P. (Croydon): Mr. Brodie's paper presented to the Conference to-day is excellent, but with regard to his scheme for a 120 ft. wide road, as shown on that diagram, I think we shall have to wait until the millennium before such ideal roads can be carried out in England. The only way in which roads can be constructed and provided for is to make them an imperial undertaking. It is no use any large town, even Liverpool, suggesting these communications from east to west or north to south, because the cost is so immense that such provision cannot become at all general. In Croydon we are doing something in this direction, but the road is only to be made 60 ft. wide. Personally, I do not think any main road through a town should be less than 80 ft. wide, because, as Mr. Brodie says, the traffic is increasing, and whether it is motor cars or tramcars, they are bound often to go faster than the authorised speed allowed now in London and Greater London. I know perfectly well the speed limit is exceeded by every tramcar. (Laughter.) We exceed it ourselves in Croydon. (Laughter.) I was told a little while ago by our chief superintendent that he had been timing our cars, and he said they had been going at various paces up to 25 miles an hour. I said I was very glad to hear it, because people had always been complaining that we were only going at about 8 to 10 miles an hour. Anyhow, people will grumble, and through the centre of the town traffic is bound to be slow, unless you have a comparatively wide road so as to take a double line of traffic on either side of the tramways. Liverpool has greatly improved during the last decade or two, and all credit is due to Mr. Brodie and those associated with him. Doubtless, improvement will still continue under the present admirable municipal management. At the same time, we in Croydon hold that we are second to none. We pride ourselves on the fact that Croydon is the healthiest town in the kingdom; but I am afraid that we will not be able to pride ourselves on the fact that we have a main road capable of accommodating traffic at the increasing speed which is bound to take place all over the country during the next 20 or 30 years. Croydon has just had a contribution from the Road Board for a relief road 60 ft. wide, and no doubt that will help matters to a certain extent. But people will go through the centre of a town when they are passing through; they do not go on the by-roads if they can possibly get through the main road. There is another difficulty which those in authority have, *i.e.*, that shopkeepers and tradesmen have the idea that if you improve a road and make it too wide it will interfere with legitimate trade. Personally, I believe that to be a fallacy. I do not think it makes any difference to retail trade to-day. In the olden days they considered that where there was a street with a hawker and a coster trade, that street did the finest trade in the town. On the Continent and in America the roads are wider. As was said about Victoria, the roads there are made of a width of 200 ft. or thereabouts. When Winnipeg was first laid out, they provided for two roads 132 ft. wide, and when I went through that city I was struck with the width, and thought, "here is a tremendous road to keep up, and what a great expense it will be, with practically no buildings upon it." But what are the facts to-day? In 10 years Winnipeg has gone ahead by leaps and bounds, and those roads are not any too wide for the traffic now. I do not think in Winnipeg, or in any of the great cities of the States where roads are wide, that anybody has ever complained that they have interfered in any shape or form with trade. Therefore I think that if we can get wide roads we should have them right away, and not less than 80 ft. wide. I think the cost of such roads should be met by imperial funds. It should not be made chargeable solely upon the local authority to bear the burden of the cost either of the construction or the maintenance of such highways. (Applause).

The CHAIRMAN: It is almost time to close the morning session. I think we owe Mr. Brodie a more than usually hearty vote of thanks for preparing this paper and for his interesting speech this morning. As most of you are aware, Mr. Brodie is not personally a member of this Association, although the Corporation of Liverpool, which he so well serves, has been a member of the Tramways and Light Railways Association almost from its inauguration, and it was at the suggestion of our chairman that Mr. Brodie was asked to favour us with a paper at this year's conference. Before putting the vote of thanks to you, there is only one point I wish to mention, it was raised by Mr. Steele, the city engineer of Newcastle, viz., that it would be impossible if a tramway were laid at the side of the footpath for the same speed to be maintained as if it were laid in the centre of the road. I will ask Mr. Brodie to deal with that point because I cannot see why we should not maintain the same scheduled speed with a tramway laid by the side of the road as with a tramway in the centre of the road, that is, always providing the tramway has its own right of way. We all know that the chief thing that interests us as managers in this paper is the question of town planning in relation to tramways and car speed. I do not think that tramway managers as a rule fully recognise the great effect speed has upon their working expenses. The higher the average speed—I speak with some knowledge because my average schedule speed is about 10 miles per hour—the higher the schedule speed you can maintain the lower the working expenses must be per car-mile; the only thing it affects detrimentally is upkeep of cars, but on the other hand speed undoubtedly gets traffic. But I think if it were commercially possible for us as tramway companies to contribute

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a reasonable amount towards road widenings when any town planning scheme is under consideration, it might be in some instances to our ultimate benefit. I have very great pleasure in asking you to accord a hearty vote of thanks to Mr. Brodie. (Applause.)

Mr. Brodie: Allow me to thank you all for the very kind way in which you have passed this vote of thanks. I was very pleased to meet the wishes of your Chairman and to prepare the paper for submission to this important meeting of the Association. Mr. Coutts raised the question of grass; he is somewhat afraid of grass; now in Liverpool, as a result of our experience, we are not. We have at the present time, I suppose, some 10 or 12 miles of road in which we have grass growing on each side along the whole length. We have constructed about 20 miles of widened roads in Liverpool in the last 15 years, many of them 114, 108, 100, 80, and 70 ft. wide, and we now have two roads 110 ft. wide. Within the past week I have been authorised by my committee to negotiate the purchase of additional land in a road which they laid out some seven or eight years ago to 84 ft., with the object of widening it to 120 ft. I think this point may be interesting to tramway men as showing that wider roads are, as the result of experience, becoming more appreciated. The grass difficulty is not very serious, but like everything else, it requires to be properly tackled and dealt with. There are grasses and grasses; if you put down rye grass you may expect a good crop at the beginning of the season; if you put down grasses of the fescue class in a road you will have a hard grass, good from the point of view of wear, and which will require little or nothing in the way of cutting. The other point which Mr. Coutts raised was the packing of the rail. We are trying to follow what Mr. Sellon says has been his method, and in Liverpool put down a first-class job in the first instance. We believe that if we do so we will be repaid by a minimum of maintenance. I do not anticipate much difficulty in the way of packing, but where we have of necessity to fill up a big depth, we will probably not grass it until the filling in has completely settled. Mr. Hogg, the gentleman who spoke of wide roads in Victoria, says 90 ft. roads are as much as is required; I am bound to say I do not agree that it is sufficient in the case of the larger towns in this country—90 ft. will not provide for what I conceive will be the conditions in the near future. I hope Liverpool may, through some of its badly congested areas, put down really wide roads. As I say in my paper, Liverpool has, within the past 50 years, spent £4,000,000 sterling on widening and improving roads, and that figure is, I think, enough to make any responsible person think. It is all very well to say you can wait and do it cheaply, but as a result of experience I do not think so. Mr. Sellon asked why we recommended that the tramways should be laid in the centre of the roadway rather than at the sides of the road in grass. In Boston, Berlin, and in a number of other places, you can see them to-day working quite satisfactorily in grass in the centre of the road or street. The objection I have, as a road engineer, to tramways on the sides is that you cannot get what the owners on side streets are entitled to have—proper access to the main road from side streets without interfering with the speed of the tramways. Tramways are not pleasant things to have too near the front of the house in which one dwells. I know you can get accustomed to tramway noise if you are healthy and strong, but people do clear out sometimes from tramway streets. If you can reduce the noise—and I think you should do so—on tramways, there would be less objection from that particular point of view to tramways on the side, but we have to face the facts, and the further you keep away from the residential houses the better. I think that meets Mr. Sellon's point.

Mr. Sellon: Is it not a fact that a sleeper road laid all by itself for the purpose of tramways alone, must be much more silent than an ordinary tramway laid on a concrete foundation?

Mr. Brodie: Generally speaking, yes; but not always so. I happen to live a short distance from a tramway, and also a short distance from trains, the railway being laid on sleepers, and both are disturbing. The difference is that whereas you only occasionally get a train, you have the tramcar with you all the time. Mr. Bland raised the question of the powers under the Town Planning Act; I think his point was rather a matter of the artistic appearance of houses, but under the Town Planning Act of 1909 you have now powers to some extent to control the number of houses to the acre, and also the elevation of the houses facing such widened roads. Mr. Steele dealt with quite a number of points which I think to some extent answer some of the other questions which have been raised. On the question of subways in London, I am not aware that subways are paying any great return on the ordinary capital, even where the traffic is very heavy. If that is the case in London, what would be the result in the larger towns in the provinces where the traffic is necessarily much less. Mr. Steele also raised the question of ring roads; we have such a road about seven miles long through the still unbuilt area in Liverpool, the minimum width being 84 ft. and the maximum being about 120 ft. The person who wants to take the fastest road, say, from north to south will take the ring road, because if he goes down the narrow streets in the middle of the town he must slow down in traffic. The man who is going to a town for the purpose of seeing it, or for business, will do as Mr. Steele suggests, and go into the town, especially if he has not been there before; but most motorists, after they have been over a road a dozen times, begin to look out for the nearest way. One difficulty which has arisen on ring roads in Liverpool is this, we find heavy motor wagons coming in increasing numbers from the manufacturing districts of Lancashire, and they will take the ring road. We are not anxious for them to use that ring road, because it was constructed fairly cheaply for light traffic, and we are very anxious to get them off it, but they recognise its advantages. Our friend from Croydon, Mr. Allen, spoke of the millennium. Well, though it is not here yet we ought all to travel in the right direction. With some experience in this class of work I venture to think that nothing I am recommending here is beyond the probable requirements of, say, 20 years from to-day. After all, the engineers who are dealing with big towns have not got to deal with questions of to-day, or to-morrow only. What is being done on the outskirts of big towns all over the country to-day is intended to last for at least 100 years, and the engineers who are responsible will be judged and their work appraised by people who come after them and who will live under very different conditions. I think, Mr. Chairman and gentlemen, I have dealt with practically all the points which have been touched on by the speakers. I am very much obliged to members of the Conference for so kindly listening to what I have had to say. (Applause.)

The Conference proceedings then ended.

THE SOCIAL PROGRAMME.

An interesting programme had been arranged for the entertainment of the members of the Conference and the visitors, but unfortunately this was somewhat marred by the bad weather. The garden party at Leazes Park, to have been given by the Lord Mayor and Lady Mayoress, on Wednesday afternoon, had to be abandoned, a social gathering at the Newcastle Picture House, which proved most enjoyable, being substituted. Through the courtesy of Mr. Ernest Hatton, general manager of the Newcastle tramways, a number of members visited the power-station, sub-stations; and car depots and shops, where they found much to interest them. In the evening the Lord Mayor and Corporation gave a banquet at Tilley's Rooms, where there was a large and distinguished gathering, thoroughly representative of the official and municipal life of the city. On Thursday afternoon, at the invitation of the Corporation, a trip by steamer was made to Tynemouth, where the chairman and directors of the Tyneside Tramways and Tramroads Company entertained the party to tea at the Grand Hotel, and in the evening a supper and dance was given at Tilley's Rooms by the chairman and directors of the Northern General Transport Company and the Gateshead, Tynemouth, and Jarrow Tramways Companies. Headquarters were at the Central Station Hotel, and the Congress badges entitled holders to free conveyance on the Corporation tramways, as well as on the systems of the five northern tramways companies. All the arrangements were excellent, and Alderman Rodgers and Councillor Mayne, the chairman and vice-chairman of the Corporation Tramways Committee, were indefatigable in their attentions, as also was Mr. R. R. Wedderburn, the Lord Mayor's secretary, to whom special thanks were accorded for his unfailing courtesy. All the arrangements for the meetings were, as usual, admirably carried out, and Mr. A. de Turckheim, secretary of the Association, received well-merited congratulations on the success of the Congress.

RAIL JOINTS: THEIR CONSTRUCTION AND MAINTENANCE.

By J. B. Hamilton.

I regret that it was quite impossible, owing to my being in attendance at Westminster, to take part in the discussion on the paper by Mr. Humphries. The subject dealt with is of such importance in tramway operation, that I have to thank you for your kind permission to communicate some observations with regard to the matter.

On reading the paper, I was much interested in Mr. Humphries' description of the electrical process which he has utilised on the Birmingham and Midland Tramways. I note, however, that his practice has been entirely confined to the improvement of worn joints. It would, of course, be impossible to utilise the process for new track unless by the erection of additional overhead negative wire, or by earthing the current, which would be an imprudent thing to do. As a method, however, of repairing worn joints, the process described may have its value.

I have looked into the question of the costs, and my remark is that they seem exceedingly low, in fact much lower than it would be possible to do the same work in Leeds. In one of the cases it clearly does not include any reinstatement of the roadway. I mention this as a general observation, and trust Mr. Humphries will not think I offer any undue criticism in regard to his process, seeing that he did not have the opportunity of replying to me.

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With regard to the remainder of the paper, I must confess to some disappointment. I had thought that the writer would probably give an estimate of the values of the different forms of rail joint construction, instead of a somewhat meagre description of several more or less known processes. I cannot speak with any extended personal knowledge of the use of some of these, but with regard to the employment of Thermit we have had in Leeds probably a longer experience than any tramway undertaking in this country.

The first joints welded by Thermit in this country were on the Leeds tramways, in the autumn of 1902. Since that time, apart from worn tracks, over 15,000 joints have been welded by this process, either in renewal of track or when constructing new lines. In some cases the rails thus treated have, since being welded, carried over 30 million tons of traffic, and the joints are in perfectly good condition at the present day.

Like all new processes, whilst the general principle is identical with that in use at the date of the first rolling, great improvements, the result of experience, have been made in its application. At the commencement, no butt welds were made. The rails were not preheated nor so carefully cleaned and prepared, and the dressing off to get a true alignment received but little attention. In several other ways greater exactitude with corresponding improvements in the welding process have been discovered and adopted.

The result of all these improvements and greater skill in the manipulation of the extraordinary heat evolved is that in Leeds, during the past eight years, the number of breakages does not exceed ·4 per cent., that is, one break in 250. Further, on lines which have been made and welded during the past four years there is not a single record of a breakage having occurred.

Anyone familiar with the results of Thermit welding will be aware that the effect is to entirely obliterate the joint, so that the rolling stock passes over the rails perfectly smoothly and without the slightest indication that a joint is present.

Whilst great improvements have been made in the actual welding process, experience has also shown the necessity for avoiding any expansion or contraction. Our experience in Leeds is that practically all the injury done from this cause is initiated during the process of laying the rails, and this experience is fully borne out by the statement of Professor Vernon Boys, made 10 years ago. He pointed out "that the small area of exposed rail, the weight of the surrounding material which is non-conducting, the adhesion between rail and road bed, coupled with the compressibility of the steel, are sufficient to counteract any destructive effects due to change of temperature."

In many cases the joints may have been well prepared, and the rails may have been thoroughly packed, but as they are frequently left exposed to the variations of temperature for some considerable time before being paved in, the joints are loosened, and the rails are raised from the packing, with the result that the tramcar traffic (coupled with the percolation of water) slowly but surely accomplishes the destruction which was commenced prior to the rails being paved in.

We have found in Leeds that the only way to lay a stable track is to take due care during the construction that no rails are packed until just before they are ready to be paved in, and even then they are carefully sounded before this operation is commenced. The packing is only allowed to precede the paving by about one rail length. It has been found advisable not to weld up too long lengths of rails prior to the packing and paving, as rails laid in this manner will buckle under the changes of temperature, and minute fractures ensue which will develop at a later date under the traffic. In Leeds the rails are anchored one foot on each side of the joint, and at an average of 12 ft. intervals between joints. Anchors with wedges are used, and the wedges are not driven home until just before the paving bed is laid. In this manner a certain amount of latitude is allowed to the rail, and there is no danger of its hogging between anchors when expanding. The rail packing only precedes the bedding operation by about one rail length, and the bedding, which consists of cement compound in a moist condition and which is rammed *in situ*, is only laid one rail length before the paving. This cement compound is used in preference to wet floating, which takes at least several days to set, during which time considerable damage is done to the rails which are left exposed to the changes of temperature. This bedding, which is rammed in a moist condition, is ready to be paved on immediately it has been rammed. It covers the base of the rails as only 5 in. setts are used, and forms an additional anchorage and assists in waterproofing the rail base. The laying of this compounded bed is only allowed to precede the paving operation by about 10 or 12 yards. In this way it is possible to have each of the operations previously mentioned under immediate and close supervision, as the various final operations are executed at about the same place and simultaneously.

The writer has referred to the results obtained by slowly applied pressure to the joints made under the process he advocates, at least for worn track. I do not consider that this test is an important one as applied to a tramway rail joint, which in practice is subjected to a rolling load. However, I may say that we have frequently tested the Thermit welded joints to destruction by the same method of gradually applied pressure and have cases in which they withstood a pressure of 80 tons. The test piece was upon bearings 3 ft. 6 in. apart, and the fracture usually occurred about 2½ in. away from the joint collar. We have also subjected Thermit joints to a pneumatic hammer test, in which case it was subjected to several hundreds of blows from a 1 cwt. hammer without the slightest indication of a fracture or other injurious effects.

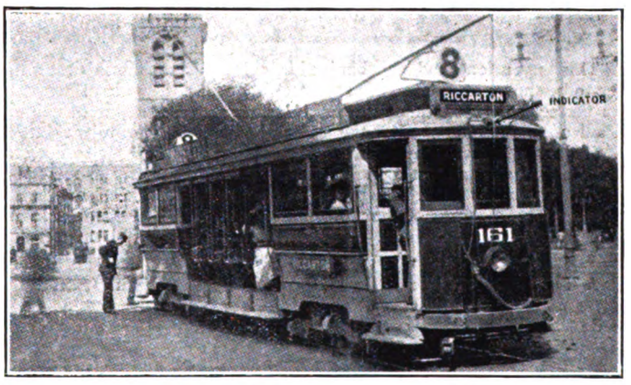
In giving particulars at this length, I have presumed from reading the paper that the writer has had but little personal experience of Thermit welding, and I have thought it due to the many users of Thermit welding throughout the country to enlarge somewhat upon this form of joint construction. Leeds having been the first place at which this method was tried, has naturally been frequently asked for their experience in connection with Thermit. These experiences have been carefully and frankly given in all cases, and it is exceedingly gratifying to know that many of the leading Corporation and tramway undertakings of the United Kingdom have definitely adopted this process of joint construction.

I am sure that all those who have given an extended trial to Thermit welding could give practically the same testimony as to the results as I have referred to.

I have observed with some interest that municipal tramway constructors have been more enterprising in the adoption of Thermit than those whose work has lain more in the direction of construction for private enterprise. Probably the slight extra cost of Thermit over an ordinary fish-plated joint may be the cause of this delay. If so, I can only say that it is a penny wise and a pound foolish policy. As soon as tramway consulting engineers get some direct personal experience of the use of Thermit—this, of course, can only be got in the case of lines which have been in operation for some time—then I am sure they will agree with our decision in Leeds, that whatever the future may bring forward in the direction of rail construction, a joint welded by the Thermit procees has no equal at the present time.

A TRAMCAR DESTINATION INDICATOR.

The "Wearn" patent indicator is an optical device, designed to take the place of mechanical contrivances. By this invention numerical or named destination indicator signs are shown on the top of the tramcars by day and night, and in all weathers with perfect safety to the operator, as this appliance enables him to alter the sign or number for a change of route from the inside of the car without the risk of danger from leaning or stepping from the car to see whether his destination is correctly shown. As this duty is usually in charge of the conductor in this country, the device relieves him of some responsibility and leaves him more free to look after his passengers at the termini. Existing mechanical indicators, of which there are many types, do not allow for any alterations to or the insertion of any additional names. Shrinkage



Car Fitted with the Optical Indicator.

of material from which the screens are made owing to climatic causes is another reason why mechanical indicators have not been found satisfactory.

Wearn's patent indicator is designed to be mounted upon the canopy of the car or other position in front of the destination board and is provided with an eye-piece so placed that the conductor can see conveniently from the inside of the car if the name is displayed correctly. A number of these indicators are already in use on many systems in the Colonies and abroad, and are reported to be giving satisfaction to the men, the management, and the public. The indicator weighs 1 lb., and measures 5 in. by 4 in., and, it is claimed, will last as long as the car on which it is fitted. It requires no attention either by day or by night; and in all weathers the destination on the sign can be seen by the motorman or conductor, from their stations inside the car. These indicators can be fitted without alteration to existing cars; and the device will shortly be placed on the market by the Equipment and Engineering Company, of 2 and 3, Norfolk Street, Strand, W.C.

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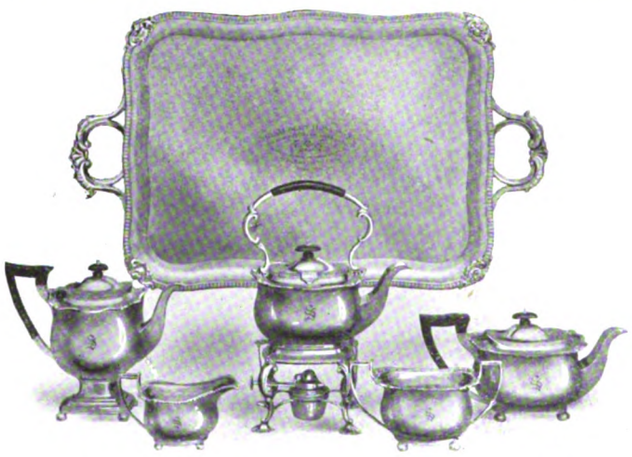
PRESENTATION TO SIR A. STANLEY.

Special interest attaches to the presentation made to Sir Albert H. Stanley, managing director of the Underground Railways, on July 24, because the fund for the testimonial emanated entirely from the staff of the "T.O.T." group, and was collected under a stipulation that no member of the staff or officer could contribute more than the sum of 1d. Approximately 20,000 pennies were collected from the employees of the Metropolitan District Railway, London Electric Railway, Central London Railway, City and South London Railway, London General Omnibus Company, Associated Equipment Company, and London United Tramways.

The presentation was made at Electric Railway House, Westminster, and it took the form of a silver tea and coffee service—a replica of an old Georgian pattern—and a handsome album containing the 20,000 signatures of the staff. The inscription on the silver tea and coffee service was as follows: "Sir Albert Stanley. From nearly 20,000 employees of the T.O.T. companies, in appreciation of the honour conferred by His Majesty the King—June 22, 1914." About 60 representatives of the departments attended the ceremony.



Presented to Sir Albert H. Stanley.

The 20,000 signatures of the staff who contributed to the fund were collected in a handsomely bound album which forms a more than usually interesting memento of the occasion. This album has been divided into T.O.T. sections, thus, the first section of the book under the letter "T" (train) contains the names of the employees on the railways; the second "O" (omnibuses) the names of the London General Omnibus Company and Associated Equipment Company's employees; and the third section under "T" (trams) the signatures of the London United Tramways employees.

Mr. W. E. Mandelick, the secretary of the Associated Companies, made the pre entation to Sir Albert on behalf of the staff, and expressed the hope that the holiday which Sir Albert was about to take would thoroughly re-establish his health. Motorman Harris (District Railway), Conductor Barr (London General Omnibus Company), and Mr. Miles (works department of the London United Tramways), each added a tribute from the departments they represented. Each speaker testified to their feelings of respect and esteem towards the managing director. Motorman Harris expressed the hope that it would be many years before Sir Albert ceased to be connected with them. They regretted that a larger number could not be invited to attend the ceremony, and they hoped that at some future time Sir Albert would be able to come among them and express his thanks publicly. Conductor Barr especially thanked Sir Albert for what the directors had been able to do for the employees recently.

Mr. W. E. Mandelick making the Presentation to Sir Albert Stanley on behalf of London Traffic Companies' Employees.

Sir Albert Stanley, who was warmly cheered, was some time before he could give utterance to his feelings in returning thanks for the unexpected gifts. He had, he said, been much assisted in his work by the support he had received from the men employed by the companies, and he had always striven to do what he could for the employees. The greatest satisfaction he had experienced in connection with the honour bestowed upon him by His Majesty had been in the universal expression of satisfaction and congratulation on the part of the men, and it now gave him extreme pleasure to receive these visible tokens of their congratulations. If they considered, as their representatives had stated that day, that in his treatment of the men he had acted fairly he was well satisfied. (Applause.) They were all working shoulder to shoulder in the problem of London and district traffic. Their object was to make their services ideal ones to which other countries could point, and to make every man proud that he was associated with the company. In conclusion Sir Albert remarked that the recollection of that morning's proceedings would always cheer him on. (Applause.)

Motormen's Promptitude Rewarded.—Two of the Birmingham Corporation motormen have been complimented by the chairman of the Tramways Committee (Mr. Harrison Barrow) and awarded £1 each for individual smart actions. Driver Goode pulled his car up and avoided a woman who was unconsciously walking backwards into danger, and by similar action on another occasion he saved the life of a child who had run in front of the car. Driver Tustin by promptly stopping his car avoided running into a motor omnibus and a motor cycle, which had collided.

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FINANCIAL REPORTS AND MEETINGS.

Clontarf and Hill of Howth Tramroad Company.—An interim dividend of 3s. per share has been announced

Blackpool and Fleetwood Tramroad Company have declared an interim dividend at the rate of 4 per cent. per annum.

Sao Paulo Tramway, Light, and Power Company.—The directors announce a dividend of 2½ per cent. on the capital stock.

London Electric Railway Company.—The interim dividend for the half-year ended June 30 is at the rate of 1 per cent. per annum on ordinary shares.

Bristol Tramways and Carriage Company.—An interim dividend has been declared at the rate of 4 per cent. per annum for the half-year ended June 30.

Metropolitan District Railway Company.—For the past half-year an interim dividend at the rate of 3 per cent. per annum on the second preference stock is announced.

Kalgoorlie Electric Tramways Company.—The accounts for 1913 show, after providing for interest and sinking fund on the A debenture stock, a deficiency of £6,520.

Oldham, Ashton, and Hyde Tramways.—The directors have announced a dividend at the rate of 5 per cent. per annum, less income tax, on the ordinary shares for the half-year.

Mumbles Railway and Pier Comany.—Interim dividend at the rate of 7½ per cent. per annum (7s. 6d. per share), less income tax, on the ordinary shares for the half-year to June 30.

Swansea and Mumbles Railway Company.—Interim dividend at the rate of 9⅜ per cent. per annum (7s. 6d. per share), less income tax, on the ordinary shares for the half-year to June 30.

Paisley District Tramways Company have declared an interim dividend at the rate of 5 per cent. per annum on the 5 per cent. cumulative preference shares for the half-year to June 30.

Liverpool Overhead Railway.—Interim dividends have been declared at the rate of 5 per cent. per annum on the preference shares and 2½ per cent. per annum on ordinary shares for the half-year.

The City of Buenos Ayres Tramways Company (1904) have declared a dividend of 1s. 3d. per share (being at the rate of 5 per cent. per annum), less income tax, for the three months to June 30.

Melbourne Tramway and Omnibus Company, Limited.—The London secretary has received cable advice of the declaration of a bonus of 2s. per share from profits for the year ended June 30 last.

Plymouth Corporation Tramways have reported a very successful financial year. The income amounted to £40,880, an increase of £1,800, while the net profit at £4,037 is an increase of £1,400.

British Columbia Electric Railway Company.—A dividend at the rate of 5 per cent. per annum on the 5 per cent. preferred ordinary stock has been declared for the half-year ended June 30, and an additional dividend at the rate of 1 per cent. per annum for the same period.

Dublin United Tramways.—The directors have declared an interim dividend for the half-year to June 30 at the rate of 6 per cent. per annum, less income tax, on the preference shares, and at the rate of 5 per cent. per annum, less income tax, on the ordinary shares.

Lanarkshire Tramways Company.—For the half-year to June 30 the revenue amounted to £50,595, and the expenses to £32,650. The available balance is £15,935, out of which the directors recommend a dividend at the rate of 6 per cent. per annum, leaving £5,645 to be carried forward.

London and Suburban Traction Company Dividend.—An interim dividend on the ordinary shares has been declared at the rate of 1 per cent. per annum for the six months ended June 30. This is the first dividend paid by the company on ordinary shares. The company was formed in November, 1912.

Chatham and District Light Railways Company.—For the past half-year the revenue was £23,548 and the expenditure £13,756. The available balance is £7,298, and a dividend at the rate of 3 per cent. is to be paid for the half-year, carrying forward £2,768. Three additional cars will shortly be put into service.

London General Omnibus Company Dividend.—The directors have declared a dividend of 8 per cent., free of income tax, on the ordinary shares for the half-year ended June 30, being at the same rate as last year. Owing to the acquisition of the assets of other omnibus companies, the dividend is now on the increased capital of £1,600,480, as against £1,150,480 last year.

City of Carlisle Electric Tramways.—The accounts for 1913 show a total revenue of £9,922, and after providing for debenture and loan interest and writing £529 off suspense account, the debit balance of £665 brought forward was converted into a credit of £33. In order to pay for outstanding portion of the cost of reconstruction of the system, the directors recommend the creation and issue of £20,000 6 per cent. second debentures.

Underground Electric Railways Company.—In the opinion of the directors the receipts in respect of the past half-year justify the distribution of approximately £60,000 by way of interim dividend. The board, however, have decided to defer the question of the payment of a dividend until the next annual meeting, when it can be dealt with on the audited accounts for the complete year. Interest on the 6 per cent. first cumulative income debenture stock will be paid on September 1 next.

Durban Municipal Tramways.—In his report for the past year Mr. H. W. Thomas, the general manager, states that the revenue totalled £133,224, and the expenditure £115,551, which enabled the department to contribute 4 per cent. in relief of rates and place the balance to the newly-formed contingency account. The results were 9·14 per cent. over the previous year's receipts. The passengers carried in 1911-12 numbered 15,655,757, and for the past year 17,297,836. The car-mileage was 1,783,697.

Cardiff's Grant for Relief of the Rates.—The report on the working of the tramways for the past year shows traffic receipts amounting to £142,000, an increase of nearly £12,800 on the preceding year. The total income was £166,199, £15,573 in excess of the previous year. This constitutes a record for the undertaking. Sir John Courtis, who presided at the meeting of the committee on July 27, complimented Mr. Ellis, the manager, and staff on the success achieved, and it was resolved to devote £4,800 to the relief of the rates, equivalent to 1d. in the £. It was decided to defray the cost of doubling the Niman Road track to the extent of £6,010 from the reserve fund, which has been reduced to £3,672.

General Electric Company.—Mr. Hugo Hirst, presiding at the annual meeting of the General Electric Company, said that the net trading profit was £157,893, as against £145,260 in the previous year. By a large minded arrangement between the leading firms of Germany, America, and this country co-operation in research and laboratory experience was taking place, and it was extraordinary what rapid advances had been made In conjunction with Messrs. Pirelli, of Milan, the General Electric Company had formed a company for the erection of a cable factory at Southampton. The capital was £200,000, each party subscribing 50 per cent. The directors hoped within a few months to supply cable which would compare favourably with that of any other firm

Blackpool Corporation Tramways.—The annual report of Mr. Charles Furness, general manager of Blackpool Corporation Tramways, for the year ended March 31 states that the year's receipts amounted to £84,796, and the gross profit to £41,310, which has been allocated as follows: Interest and sinking fund charges, £16,758; permanent way renewal fund, £10,000; reserve fund, £2,552; amount contributed in aid of rates, £12,000. Compared with the previous year the receipts have increased by £10,631, gross profit by £6,826, net surplus by £6,220, passengers carried by 1,836,982, and mileage by 25,828. The working expenses show an increase of £3,805. The average total receipts per car-mile attained the record figure of 18·91d., as compared with 16·93d. for the previous year.

British Electric Traction: Scheme for Reduction of Capital.—The directors of the company recommend that the share capital be reduced by £908,372, from £2,947,380 to £2,039,008. It is proposed to consolidate the five classes of stock into £672,654 6 per cent. cumulative preference stock and £1,366,354 ordinary stock. Thus the share capital will be reduced by £908,372. The income certificates (£266,371) are to be converted into £93,230 ordinary stock. The directors estimate that on the basis of the expected profits for the year 1914-15, holders of the ordinary stock would, under this scheme, receive a dividend of 4 per cent. for the year. Every additional 1 per cent. would require a further £13,663, which is approximately the average annual increase in profits for the past four years.

The Universal Penny Fare at South Shields.—Mr. W. T. Robson, general manager of the Corporation Tramways, in his annual report, refers to the striking success of the abolition of the fare stages made at the beginning of the 12 months. This had been an immense boon to the users of the cars, the average journeys per head of the population per annum increasing from 76 to 90. The maximum distance possible for one penny was 3·1 miles, a figure which would bear comparison with any other town. The year had been the most successful yet experienced. The net surplus amounted to £7,106, an increase of £788. The revenue was £38,330, an increase of £4,178, while the passengers carried totalled 10,005,164, an increase of 1,548,476. The total operating costs per car-mile worked out at the very satisfactory figure of 6·03d., which would be found to be amongst the lowest in the country.

Result of a Change of Policy at Burnley.—A balance of £25,367 was carried to the net revenue account as the result of the operation of the tramways in 1913-14, the expenditure being £62,948, and the receipts £88,316. Of the balance, £7,687 was carried to the borough fund. The gross traffic receipts had increased by £25,441, or 41 per cent., compared with five years ago, while the car-mileage had increased 525,587, or 43 per cent., and the route-mileage 16 per cent. The car-mileage showed a material increase owing to a change of policy. In past years the mileage had been restricted until the receipts in 1912-13 reached 13·18d. per car-mile. From June, 1913, a very much improved service was put into operation, and the bulk of

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the increased mileage was due to these better services. It was too soon to determine finally whether these should be permanent. The receipts per car-mile were reduced to 12·04d., which was still above the average, showing more mileage was required.

Queensland Government's Profit-Sharing Scheme with Brisbane Tramways.—In his remarks at the annual meeting of the Brisbane Electric Tramways and Investment Company, Mr. H. R. Beeton, the chairman, observed that towards the close of last session the Queensland Government introduced a bill very similar to that promoted earlier in the year by the local authorities (which was allowed to drop), with a view of constituting a trust with power to purchase the tramways in agreement with the company at any time, or, as an alternative, to come to a profit-sharing agreement. The bill was read a first time in November last, and would come up later. If the bill became law the directors would be prepared to discuss terms. The objection raised by the Australian Tramways Employees' Association to the company's application for an order prohibiting proceedings on the award made against the company in the Arbitration Court had been overruled, and the case would be heard on its merits. Hearty votes of thanks were accorded by the meeting to Mr. Badger, the manager, and his staff.

A Record Year at Brighton.—The accounts of the tramway undertaking show a revenue of £56,833 for the past year, and a balance of £14,397 carried to the net revenue account. The total revenue increased by £3,039, and the working expenses (which include nearly the whole of the cost of renewals during the year) an increase of £2,934. The surplus amounted to £842, as against £931. Passengers numbered 11,839,515; the average working expenses per car-mile were 8·80d.; average total revenue per car-mile, 11·79d; average fare paid per passenger, 1·11d.; average number of passengers per car-mile, 10. The total revenue increased by £2,820, and constituted the greatest year's takings since the undertaking has been in operation. During the August race week the number of cars was found to be quite inadequate, and the manager and engineer, Mr. W. March, states that the three now being built will not be enough to make very much difference on the busy days in August. On August 8 an arrangement was put in force for the issue of through tickets to and from the Devil's Dyke in connection with the omnibus company, and 7,412 passengers were carried. Heavy steel-tired steam lorries continued to play havoc with the soft-wood paving and cast-iron work forming the surface of the road.

Accounts of Halifax Tramways.—The annual accounts of the tramways show receipts totalling £109,650, or an average of 11·738d. per car-mile, as compared with £105,973 in 1912-13. The receipts included the following items: Revenue from passengers, £105,674; private cars, £155; G.P.O. carriage of mail bags, £105; ticket vouchers and tokens, £351; luggage, £185; parcel traffic, £2,147. The expenditure amounted to £73,272, or an average of 7·844d. per car-mile, as against £69,661 in the preceding year. Chief among the items were: Permanent way, £5,702; overhead equipment, £1,329; parcel traffic, £1,270; power expenses, £20,425; and repairs and maintenance of cars, £7,959, inclusive of £2,595 for motors, armatures, etc., and £1,123 for trucks, wheels, and axles. £4,433 of the car repairs and maintenance was on account of material and £3,526 for wages. After meeting interest on loans, sinking fund and interest, etc., the net profit was £13,643, which was appropriated, £6,033 in relief of rates, £2,324 to balance of capital cost of motor omnibuses, and £5,792 to the renewals fund. Units used per car-mile were 1·94. Of 101 cars in stock 75 were in use daily. The average speed was 7·23 miles per hour, as against 6·8 in the two preceding years. The renewals fund stands at £34,122. £117,564 of mortgage debt has been redeemed, leaving £297,327.

Kalgoorlie Electric Tramways.—Presiding at the ordinary general meeting in London on July 30, Mr. A. H. P. Stoneham said that although the receipts were some £3,000 less, and wages, after the arbitration award, were £600 more, the net receipts were only £500 less than in the previous year, which he thought the shareholders would consider, under the trying circumstances, very satisfactory. The great trouble they had to deal with was the very unfair competition which the Council had thought proper to permit. As the shareholders knew, they had to pay to the Council 3 per cent. of their gross receipts, and they had to keep their track in good order for the whole of their mileage; and the Council had let down their own track to such an extent that the whole of the traffic passed over the track of the company. The Council also allowed privately-owned motor cars to compete against the tramways. If motor 'buses were at work they would be under the control of the Council and properly licensed, and would be compelled to keep a scheduled time table and charge schedule fares, whereas what he complained of was that miners and others had bought private motor cars for their own pleasure, and used them for hire without restriction. They paid no licences, no wages, nothing towards the upkeep of the road, and no taxes. They had represented the matter to the Council, but they could get no redress. The company was still making good profits, and people were agitating for them to reduce their fares, to which they were strongly opposed. They were still able to pay their interest on the debenture stock and keep up the sinking fund.

PERSONAL.

Mr. Alfred O. Jensen, of 46-48, Rue de Naples, Brussels, will hereafter represent the Ackley interests.

Mr. Wm. Paterson, formerly chairman of West Hartlepool Tramways Committee, died on July 28.

Mr. A. Sinclair has been appointed charge engineer of Swansea electric lighting and tramways undertaking.

Alderman Robinson, chairman of Bradford Electricity Committee, has been asked to become Lord Mayor of the city.

Mr. G. Murray, of the British Thomson-Houston Company, has been appointed electrical engineer to the Goverment of Afghanistan.

Mr. H. Webber, tramways engineer and borough electrical engineer at Keighley, has been voted an increase of £25 in his salary.

Mr. E. H. Dixon, of Southampton, has been appointed chief lecturer in the electrical engineering department at Salford Technical Institute.

Mr. Valentine Brown, general manager of La Plata Electric Tramways Company, has arrived in England, where he will stay until September.

Mr. E. Holt, tramways manager to Ashton-under-Lyne Council, has been recommended by the Tramways Committee for an increase in salary from £200 to £250.

Mr. Geoffrey Porter, of Edmundsons' Electricity Corporation, has been appointed assistant chief engineer to the British Columbia Electric Railway Company.

Captain E. W. Morrison-Bell has been appointed a member of the Highways Committee of the London County Council in place of the late Sir Edward White.

Ex-Provost Brownlee, of Dundee, whose death is announced, was largely instrumental in starting the Corporation electric tramways and electricity undertaking.

Mr. A. C. Levis, managing director of the British Thomson-Houston Company, has been elected an ordinary member of the Council of the Institution of Electrical Engineers.

Mr. E. F. Fleet, of Newcastle-on-Tyne, who has succeeded Mr. A. Hurst as signalling engineer, entered the service of the North Eastern Company as chief draughtsman in the signalling department at York in 1900.

Mr. F. Buckley, who has been manager of the traffic department of the Wigan tramways for the past two years, has now been appointed to the position of general manager of all sections of the undertaking.

Mr. E. Cross, tramways manager and electrical engineer to Rotherham Council, has been granted an increase in salary from £500 to a maximum of £600 by increments of £50 on January 1 next and January 1, 1917.

Mr. H. Richardson, Dundee City electrical engineer, has resigned his commission as a Territorial officer on account of the pressure of his municipal work. Mr. Richardson has been associated with the Volunteer and Territorial forces for eleven years.

Councillor Harrison Barrow, chairman of Birmingham Tramways Committee, is to be requested by the City Council to allow himself to be nominated for the Lord Mayoralty on November 9 next. The Council have unanimously signed the requisition.

Mr. F. R. Davenport, managing director of Willans and Robinson, Limited, has been elected to the office of chairman of the Council of the British Electrical and Allied Manufacturers' Association, recently rendered vacant by the death of Mr. A. Bruce Anderson.

Mr. E. S. Smith, of the Electric Car Company at Preston, is leaving for Brazil to act as assistant engineer of Messrs. J. G. White and Company, Pernambuco. He has been presented with a gold watch and dressing case by the officials and employees of the Preston car works.

Salaries Increased at Aberdeen.—The Tramways Committee have recommended the granting of the following increases of salaries: Rolling stock superintendent, from £156 to £175 per annum; traffic superintendent, from £143 to £156 per annum, rising to £175 12 months hence.

Mr. L. Parker, a member of the Isle of Thanet Electric Tramways staff, and secretary of the employees' sick benefit club, has been presented with a sideboard as a token of respect on the occasion of his marriage. Mr. J. A. Forde, the general manager, voiced the feelings of the employees.

Messrs. Gillespie and Beales, of Amberley House, Norfolk Street, Strand, have recently been appointed sole selling agents to the Corporations of Great Britain by Messrs. Charles Macintosh and Company, of Manchester, for their solid motor traction tires. Messrs. Gillespie and Beales ask us to state that they will be pleased to receive inquiries from their friends.

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Mr. W. Poole, who has been appointed assistant electrical engineer of the South Australian Government Railways, was formerly in the electrical engineer's department of the New South Wales Government Railways and Tramways. Lately he has been in the service of the Adelaide Tramways Trust.

Mr. A. Sedgwick Barnard, late borough electrical engineer at Walsall, has been presented with an inscribed solid silver salver by the Mayor and members of the Corporation as a token of esteem and regard. Mr. Barnard recently accepted an appointment with the Chloride Electrical Storage Company.

Sir John Snell is to be entertained at a complimentary dinner in the early autumn in recognition of the honour of knighthood recently conferred upon him. Mr. P. F. Rowell, at the Institution of Electrical Engineers, and other gentlemen, are receiving names of those wishing of associate themselves with the movement.

Mr. S. F. H. Parsons, chief draughtsman in the commercial office of C. A. Vandervell and Company, Acton Vale, has been presented with a case of cutlery from the management and staff on the occasion of his marriage. The gift was presented to Mr. Parsons by Mr. A. G. Goodwin, the general manager.

Mr. Edgar Barralet, of Messrs. Pinchin, Johnson, and Company, who has recently undergone a serious operation, desires us to tender his thanks to the large number of friends who have been good enough to inquire as to his progress, and to assure them that he is now out of all danger and on the high road to recovery.

West Ham Tramways Staff.—The general manager has reported that it will not be necessary at present to fill the vacancy caused by the resignation by Mr. R. O. Pickmere of the post of general engineering assistant. He recommends, however, that an increase of wages should be given to Mr. A. Beckwith, the foreman, for the additional duties that would devolve upon him.

Mr. J. Slevin has been appointed borough electrical engineer of Wigan, as from August 1, at a salary of £400 per annum, with house, coal, and light, in order that he may devote the whole of his time to the electricity undertaking. The Council have directed the Tramways Committee to take the necessary steps for the appointment of a general manager of the tramways department.

Mr. Harold Collins, the new borough engineer and surveyor of Colchester, began his career as a pupil with his father, the present city engineer of Norwich. Subsequently he served as assistant to the resident engineer of the Lancashire and Yorkshire Railway, and he next became assistant to Mr. Wakelam, county engineer of Middlesex, at the time of the construction of the Council's tramways. Since 1903 he has been deputy city engineer of Norwich.

Councillor Hargreaves, chairman of the Hull Tramways Committee, on July 2 took his place for the first time as Lord Mayor at a meeting of the City Corporation. The higher status was conferred on the city by the King on the occasion of the opening of the new dock. Several members of the Corporation congratulated Councillor Hargreaves upon the distinction having been conferred on the city during his term of office, and the Lord Mayor suitably responded.

Mr. T. J. Kendrew, general manager of Southport Corporation Tramways, has been awarded an increase from £200 to £250 a year. It was stated at a meeting of the Council that during the year that Mr. Kendrew had held the position he had been given a free hand, and had proved his worth. There was formerly a loss on the tramways when amalgamated with the Electricity Committee. The gross tramway profits in 1913-14 amounted to £6,258, as against £4,634 in 1912-13.

Mr. J. R. Wignall, who since November, 1908, has been engaged in the London County Council tramway department, first on work connected with the construction and reconstruction of the tramways for electric traction, and subsequently in inspecting and reporting upon the condition of the tracks in connection with the breakdown of the vehicles on the tramways, and giving technical evidence in courts of law, has been placed on the permanent staff, at a salary of £330 a year, rising by annual increments of £10 to £350.

Mr. J. G. R. Groves, manager of Worcester Tramways Company, was married on July 3, at St. George's Church, Barbourne, to Miss E. J. Walter, daughter of the late Mr. Walter, supervisor of inland revenue, Worcester. The best man was Mr. C. W. Francis, secretary to the tramway company. Many valuable presents were received by the happy couple, including a silver cigarette box and silver trinket box from Mr. H. S. Day (chairman of the company) and Mrs. Day, a silver inkstand from Master Day, and an oak dining room clock with chimes from the tramway staff and employees.

Mr. William Marsh, engineer and manager, Brighton Corporation Tramways, has been recommended by the Tramways Committee for an increase of his salary from £400 to £500 per annum. The committee observe that Mr. Marsh has discharged his duties most satisfactorily, and he has had no increase of salary for more than seven years. They draw attention to the great amount of time and attention which, during the past three years, he has devoted to various questions arising in connection with the proposed railless traction system, and to the valuable services which he has rendered to the committee by his intimate knowledge of the subject.

Mr. R. S. Pilcher, general manager, Aberdeen Corporation Tramways, has returned from his second visit to the United States and Canada. As he successfully operates P-A-Y-E cars in the granite city, Mr. Pilcher paid great attention to the working of the system across the Atlantic, and found that it works very smoothly in the busiest traffic. Tickets are not issued, but a cash register machine is used. Transfer tickets, however, are largely adopted. The practice in vogue on the Aberdeen P-A-Y-E cars of passengers leaving the car by the near side platform is universal in the States, thus preventing the waste of time and congestion witnessed at stopping places in this country. Mr. Pilcher also favours the adoption of the by-law under which other vehicles are not allowed to pass a stationary car.

Mr. R. C. Bullough, tramways manager to Colchester Corporation, was entertained to dinner on July 28 by members of the staff who have been on the tramways since their inauguration 10 years ago, July 28 being the 10th anniversary of the tramways. The invitation was conveyed to the manager by a beautifully illuminated address, couched in the following words: "We the undersigned members of the Colchester Corporation Tramways Department desire to record our appreciation of the impartiality with which you have supervised the department since its inauguration in 1904. We respectfully ask that you will honour us with your company at a dinner to be held at the Red Lion Hotel, on Tuesday, the 28th of July, at 8 p.m." In reply to congratulatory speeches, the general manager gave a resumé of the working of the tramways, and testified to the good feeling which he believed to exist not only among the members present, but in the whole of his staff.

The late Mr. A. B. Anderson, chairman of the B.E.A.M.A., who was lost in the wreck of the *Empress of Ireland*, left estate valued at £6,260 gross and £6,059 net.

Thermit, Limited, inform us that owing to the large stocks of material in hand, the war in Europe will not intefere in any way with their business, and that quotations previously given will in all cases stand good. In order to remove any misapprehension that may influence business negotiations with Messrs. Thermit, it may be useful to point out that the company and the entire administration and personnel of the business is British.

CONTRACTS AND ORDERS.

Colne Council have accepted an offer to convert one of the car trucks to the Peckham pendulum type.

Dartford Council have given a contract to Fraser and Chalmers, Limited, for a 1,000-KW. turbo-alternator, at £4,554.

Aberdare Urban District Council have accepted the tender of Heenan and Froude for a refuse destructor at £3,416.

The United Electric Car Company, Limited, of Preston, have an order from Colne for a complete car and truck.

Walthamstow Town Council have accepted the tender of Messrs. E. Green and Company, of Wakefield, for an economiser.

The Peckham Truck and Engineering Company, Limited, have an order for one Pendulum truck from Huddersfield.

The Equipment and Engineering Company, 2, Norfolk Street, W.C., are supplying a rail grinder to Huddersfield tramways.

Bradford Council have accepted the tender of Ferranti, Limited, for two 250-K.V.A. transformers and four 150 K.V.A. transformers.

Coventry Tramways Committee have advised the Council to accept the Daimler Company's tender for two motor omnibuses at £1,626.

An Automatic Signal.—Oldham Tramways Committee have authorised the fixing of an automatic signal in Yorkshire Street, at a cost of £80.

Edison Accumulators, Limited, have received an order for two electric omnibuses to act as feeders to South Shields Corporation Tramways.

Bexley Council have provisionally accepted the tender of the British Insulated and Helsby Cables, Limited, for 3,500 yards of feeder cables at £1,200.

Croydon Corporation have purchased an electric motor car from Edison Accumulators, Limited, at £516. It is to be used by the electricity department.

Keighley Corporation have placed contracts for the supply of a 750-KW. rotary converter and transformer at £1,595, and for two water-tube boilers at £5,076.

The L.C.C. Highways Committee have been authorised to invite tenders from selected firms for the supply of fittings required for the maintenance of overhead line equipment.

Walsall Electricity Committee have accepted tenders by Babcock and Wilcox for boiler house plant at £20,124, and by Bellis and Morcom for turbines, alternators, etc., at £17,448.

Leyland Motors, Limited, have received an order from the London County Council to supply an escape van similar to 11 vans for the fire brigade now on order from the company.

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The Admiralty Contract Department have accepted tenders for Tungsten filament lamps from Cryselco, Limited, Dick, Kerr and Company, Limited, and Pope's Electric Lamp Company.

Accrington Council have placed a contract with the Chloride Electrical Storage Company for the cleaning and maintenance of the battery at the works for 8½ years, at an annual charge of £166.

Burnley Council have allotted contracts to the British Insulated and Helsby Cables, Limited, for 2,160 yards of ·1-in. cable, 1,080 yards of ·05-in. cable, and 3,410 yards ·25-in. traction cable, at £1,008.

Warrington Council have allotted contracts as subjoined: Thermit, Limited, about 100 Thermit welded joints; Titan Trackwork Company, Limited, special trackwork; A. Thorne and Sons, two sockets for tramway poles.

Stretford Council have placed the appended contracts on the recommendation of the Tramways and Electricity Committee: Lancashire Dynamo, etc., Company, booster; Bertram Thomas, switchboard; Tudor Accumulator Company, battery.

Bradford Tramways Committee have accepted the tender of the British Insulated and Helsby Cables, Limited, for 25 miles of grooved copper trolley wire, and of F. C. Booth and Company for 800 conductors' ticket boxes at 3s. 9d. each.

Fire Brigade Motor Appliances.—The Fire Brigade Committee of the London County Council have recommended acceptance of the tender of Mossay and Company, Limited, for the supply of one electrically-driven chassis for a turntable ladder, at £807.

York Council have accepted the following tenders: General Electric Company, a rotary converter and transformers at £2,793 11s. 6d.; British Thomson-Houston Company, switch gear at £175; H. E. Turner and Son, erection of a sub-station, £571 3s.

Siemens Brothers Dynamo Works, Limited, have received an annual contract from York Council for the supply of carbon, tantalum, and tantalum traction lamps, and an order from Bristol Tramways and Carriage Company for carbon filament lamps.

J. W. Courtenay, Limited, have recently secured a further lease of the advertising rights on the Belfast Corporation cars. The firm has controlled the tramway advertising in Belfast for over 20 years, their first agreement having been made with the Belfast Street Tramways Company in 1893.

Bolton Electricity Committee have provisionally accepted the following tenders: British Westinghouse Company, two 1,000-kw. and two 600-kw. rotary converters; British Thomson-Houston Company, extra high-tension three-phase switch gear; Johnson and Phillips, high-tension single-phase switch gear.

Clough, Smith, and Company, Limited, have recently secured the following overhead contracts: Northampton Corporation Tramways, Far Cotton extension; Merthyr Tramways, Cefn extensions; overhead construction of Hove experimental route for the Cedes Electric Traction, Limited.

The Brush Electrical Engineering Company have been awarded the following contracts: Salford Council, 24 double-deck bogie cars with vestibule ends, 12 of these cars to have top covers; Wallasey Council, six double-deck cars with top covers, complete with trucks and electrical equipment.

Wolverhampton Council have placed the following orders: G. and J. Weir, turbine-driven feed pump; J. Spencer, Limited, steel and feed water piping; Dorman and Smith, switchboard alterations; Mossay and Company, for the supply of a Lloyd electric 2½-ton chassis on hire for three months at £42.

Sheffield Council have been recommended to accept the subjoined tenders: Steel, Peech, and Tozer, Limited, 1,000 tons of tramway rails; Willans and Robinson, Limited, manufacture and storage of spare turbine blading material; Dick, Kerr and Company, Limited, spare coils for alternator; Stirling Boiler Company, Limited, tubes for two Stirling boilers.

Leeds Council by a large majority on July 29 accepted the tender of Siemens Brothers Dynamo Works for the supply and erection of a 13,000-kw. turbo-alternator and condensing plant at Whitehall Road power-station, at £34,160, subject to borrowing powers being obtained. The contract involves spending about £11,000 on the construction of the turbines in Zurich.

A. Starke and Company, Glasgow, who are doubling a portion of the Kingsthorpe section of the Northampton tramways, have undertaken to duplicate two further portions of that section, thus completing the double line from Regent's Square to the Cock Hotel. The charge, including Thermit joints, will be a 5 per cent. increase on schedule prices for the present work.

Sydney Council (New South Wales) have awarded contracts as follows: Babcock and Wilcox, two boilers, one Weir pump and steam and exhaust piping, £19,934; Standard Cable Manufacturing Company, bare copper cable; British Insulated and Helsby Cables, cable; Western Electric Company, feeders; Wm. Elder and Company, finials for steel poles, 4s. 4d. to 11s. 3d. each.

Hull Council have placed contracts as follow for material required by the tramways department: Creosoted wood poles, R. Wade and Sons, Hull; high voltage insulators, W. F. Dennis and Company; high-tension, hard-drawn copper wire, Edmund Le Bas and Company. The construction of the Hull Road tramways is to be proceeded with as soon as the sanction of the Board of Trade is received.

Southampton Council have placed a contract with the North Eastern Steel Company for 200 tons of tramway rails at £6 18s. per ton. Other tenders were from the Lorain Steel Company and Walter Scott, Limited, both at £7; Frank Mott at £6 14s. 3d. (three months' delivery); Dick, Kerr and Company at £6 12s.; and Barrow Haematite Steel Company, £6 10s. per ton (informal).

Manchester Council have approved of the following contracts: Welding of rail joints, Tudor Accumulator Company; ironwork for tramway refuges, W. Macfarlane and Company; 5,000/6,000-kw. turbo-alternator for Stuart Street power-station, British Westinghouse Company, with permission to sublet as follows: alternator, Siemens Brothers Dynamo Works; portion of pipework and condensing plant, Mirrlees, Watson and Company, Limited.

Doncaster Council have sanctioned the following contracts for tramway extensions: Contract No. 1, Warmsworth: J. W. Pearce and Company, Limited, permanent way construction, £7,000; contract No. 2, Brodsworth: Edwards and Company, permanent way construction, £10,433; contract No. 3, British Insulated and Helsby Cables, Limited, copper bonds, £341; contract No. 4, Guest, Keen, and Nettlefolds, Limited, tie bars, bolts, nuts, etc., £396; contract No. 5, Hadfield's, Limited, points and crossings, £1,457.

British Thomson-Houston Company, Limited, have received the following orders in connection with London railway electrification: London and North Western Railway: Main station switch gear for controlling the turbo-alternator plant in the Wembley power-station; six 1,000-kw. and 25 750-kw. rotary converters for use in sub-stations. London and South Western Railway: Eight 1,000-kw. and 15 1,500-kw. rotary converters; main station switch gear for controlling the turbo-alternator plant in the Wimbledon power-station.

St. Pancras Borough Council have awarded the British Niclausse Boiler Company the contract for four boilers, complete with Niclausse stokers, superheaters, and economisers, fitted with forced and induced draught plant, chimneys, and other accessories. Each boiler is to be capable of evaporating 40,000 lb. of steam per hour from feed at 120 deg. F., at a steam pressure of 220 lb. per sq. in., superheated 250 deg. F. The first boiler is to erected by the end of the year, and this will be done notwithstanding the present international situation.

TRAMWAY AND LIGHT RAILWAY NOTES.

ABERDEEN.

THE P-A-Y-E CARS—INTERFERENCE WITH A PROVISIONAL ORDER.

In his report on the working of the tramways during the year ended May 31, Mr. R. S. Pilcher, the general manager, states that on February 2, 1914, the Council adopted the recommendation of the Tramways Committee to extend the pay-as-you-enter principle, and sanctioned the alterations to 16 cars, and the building of six new cars to the new design. The Beach route has been operated on this principle this year, in addition to the Woodside route. The total number of prepayment cars which will shortly be in operation is 34. The Bills and Laws Committee of Aberdeen Council have declined to recognise the right of the Secretary for Scotland to insert a proviso in the Provisional Order granted by a Parliamentary Committee to enable the Council to devote one-third of the tramway surplus in any one year to one of three purposes—for the reduction of the rates, for public improvements, or for the Common Good. Last year the surplus was £12,000, and this year it is £14,062. The Scottish Secretary has decreed that the grant be restricted to £1,000 for any one year.

BRIGHTON.

JOINT PLATES TO REDUCE NOISE—UNIVERSAL EARLY MORNING FARE—NEW ROLLING STOCK.

In his report for the past year Mr. W. Marsh, the engineer and manager of the tramways, says: "Manganese steel plates to the number of 400 were fixed on the joints in Queen's Road and the lower end of Dyke Road, much to the satisfaction of those who live on the routes so dealt with. The reduction in the noise made by the cars was most marked, and it necessarily follows that the life of the rails must be prolonged in consequence." Thirty-one trucks had now been replaced with those of the Brill type. Only five axles were broken, as against 40 or 50 some years ago.—Brighton Council have reduced the tramway fares in any part of the borough to a penny up to 8 a.m. Hitherto the early cars have been run at a loss, and it is hoped that the reduced fare will alter this.—Three new cars have been added to the Brighton tramway rolling stock. These are the first cars that have been built in the works of the Brighton tramway department. They are very handsome and show various detail improvements. The work has been carried out under the supervision of Mr. Wm. Marsh, the engineer and manager of the tramways.

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BRISTOL.

The Proposed Purchase of the Tramways.

Sir E. Cornwall's Committee of the House of Commons on July 28-30 had under consideration the Corporation bill for the purchase of the tramways of the Bristol Tramways and Carriage Company, which had been passed by the House of Lords with the addition of a clause, inserted at the request of the company, placing the Corporation under the obligation to purchase the undertaking before being given powers to work the tramways. Alderman Pearson, chairman of the Tramways Option Committee, stated that of 290 tramway services in this country 172 were in the hands of local authorities, and there were only 32 cases in which deficits had to be met out of the rates. The estimate on which the Corporation were acting was £600,000 for the tramways within the city, and £70,000 for those outside. Cross-examined, he said he was surprised at the moderation of the chairman of the company in valuing the undertaking at 1½ million pounds. Sir John Snell and Mr. J. B. Hamilton, the experts who prepared the report upon which the Council came to a decision to purchase, repeated their evidence, and were subjected to long cross-examinations by counsel for petitioning ratepayers. Sir John replied that the omnibus business did not affect the value from an engineering point of view. Mr. Hamilton stated that judging by the increased expenditure of the carriage department of the company the omnibuses had not been a financial success. He did not agree that the cost of working motor omnibuses was less than working tramways. The Committee decided that the clause inserted by the Lords' Committee making purchase of the whole undertaking compulsory before the powers to work could be made operative should not remain in the bill. Ultimately the Corporation and the company agreed to a clause suggested by counsel for the petitioners. The effect of this clause is that the compulsory purchase put into the bill by the House of Lords has been struck out, and the Corporation, if they decide to exercise their option next year, will have also to purchase the outlying portions on terms to be settled by arbitration, failing agreement.

CROYDON.

Automatic Point Controllers—Purchase of Motor Tower Wagon.

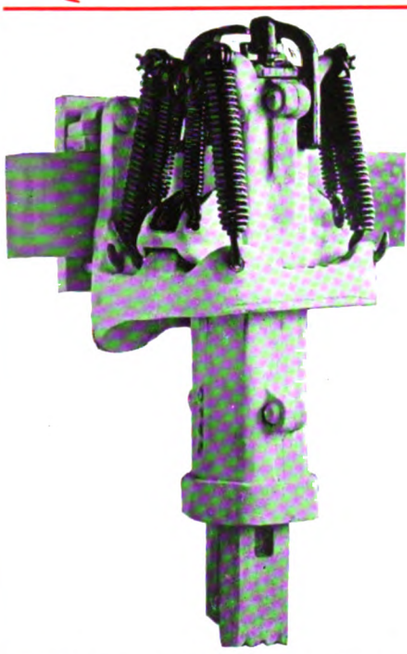
In his report for the past year Mr. T. B. Goodyer, general manager of Croydon Tramways, states that at a cost of £110 13s. two automatic point controllers were installed at Thornton Heath Pond and the Norbury terminus respectively, and had worked very satisfactorily. The Tramways Committee have adopted a recommendation by Mr. T. B. Goodyer, the tramways manager, in favour of obtaining a motor tower wagon for facilitating the work of overhead wiring repairs. The committee have been authorised to obtain tenders for the supply of the wagon.

GLASGOW.

Long-Service Employees—Forthcoming Extensions of Track—Thanks Accorded the Manager and Staff.

One hundred and four men who had been in the employ of the tramways department since the opening of the undertaking by the Corporation in 1894 were recently presented with silver badges in recognition of their service. Among those present were Sir James Bell, who was Lord Provost when the Corporation assumed control of the tramways, Councillors Kirkland and Alston, convener and sub-convener of the Tramways Committee, and Mr. James Dalrymple, general manager. Councillor Kirkland said that in July, 1894, there were 538 motormen and conductors, and to-day the number was 3,200. In addition to the men on parade 15 uniformed men would complete 20 years' service before the end of July. There were 376 men with 15 years, 531 with ten years, and 563 with 5 years' badges. It is expected that before the end of the year a start will be made with the construction of some of the tramways sanctioned in the bill which has been passed this session for about 40 miles of track in 20 miles of streets and roads. A number of the sections will link up existing routes. During August the first section of the new route from Battlefield to Newlands will be opened for traffic. Bailie Kirkland, in presenting the Tramway Committee's accounts to the Corporation said that during the year upwards of 336 million passengers were carried. Four years ago, when the Council extended the halfpenny distances, they were carrying only 222 millions. The income amounted to £1,078,691, an increase of over £70,000 over the previous year. Every 63 passengers out of 100 took halfpenny tickets. The surplus was over £53,000 as compared with £33,000 a year ago. The congestion of traffic in the centre of the city was giving the committee very serious consideration, and they had obtained power to erect a bridge at Oswald Street to link up Commerce Street. The committee were watching carefully the devopment in motor omnibuses. On behalf of the committee he cordially thanked the general manager, his staff, and employees generally for the manner in which they had discharged their duties.

"Q-FEL" Two-Bladed RAIL CLEANERS



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50

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RUSSIA	INDIA
SWEDEN	CEYLON
SWITZERLAND	S. AFRICA
ITALY	S. AMERICA
PORTUGAL	JAPAN

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LEICESTER.

POPULARITY OF TOP-COVERED CARS.

The Tramways Committee find that cars with canopy tops are much better for meeting the demands of the public than those without, and they have decided to put covers on 75 per cent., or 47 of their present cars. The estimated cost is £101 10s. per car for the manufacture and delivery of the canopies, which will be fixed by the Corporation workmen at the car shops.

LONDON.

THE CONSULTATION WITH M. MARIAGE—LINKING-UP SCHEMES AND OPPOSITION—EXTENSIONS AUTHORISED—COST OF CONDUIT CLEANSING.

The Highways Committee reported to the London County Council on July 21 that, in accordance with the Council's resolution that the traffic congestion caused by dead-ends, other roadway obstructions, and street markets, should be removed as soon as possible, they have considered the whole subject, and have consulted M. A. Mariage, Directeur-Général des Omnibus de Paris, with regard to various phases of the problem. The committee proposed to postpone until after the summer recess the submission of their full report.—From reports presented at the July meetings of various borough councils, indications of some of the linking-up schemes are forthcoming.—It is proposed to extend the Hampstead Road lines to Tottenham Court Road, and through Bayley Street to Russell Square, to Theobald's Road tramway. A second project is for a tramway from King's Cross, along Marylebone Road, to Edgware Road. Although tramway facilities for reaching Olympia and Addison Road Station are much needed, the Kensington Council are opposed to a scheme for linking the lines at Shepherd's Bush with those at Hammersmith Broadway, by laying a new track through Holland Road, Kensington Road, over Addison Bridge, and along Hammersmith Road. Other schemes are the linking of Gray's Inn Road lines with those in Farringdon Street and Clerkenwell Road, via Holborn Viaduct, and the Victoria Station dead end with Westminster Bridge via Victoria Street. Apparently the only unopposed proposal is to join the Waterloo Bridge Road line with Blackfriars via New Cut.—The County Council have approved of the Highway Committee's proposal for the construction of a third track in Blackfriars Road at a cost of £3,500, in order to facilitate the traffic to and from the Embankment shelter during the busy hours. There is already a third line for a short distance, ending in the old terminus which existed before the tramways were extended over Blackfriars' Bridge. Sanction has been given to the following schemes: Construction of a tramway from East Hill, Wandsworth, to Wandsworth High Street, at a cost of £29,350, in order to link up the Embankment, Clapham Junction, and Wandsworth route with the line running to Putney Bridge and Shepherd's Bush and the Garratt Lane line to the Embankment and Tooting; reconstruction for conduit traction of the Metroplitan Electric Tramways Company's late line from Finsbury Park to Manor House, thus linking up with the Council's line from Stoke Newington to the City.—During the 12 months ended January 21, 1914, the cost of the removal of sludge from the conduits on the Council's tramways amounted to £6,471, the work having been done by contract.

MANCHESTER.

SUPERANNUATION OF EMPLOYEES—SHELTERS FOR PASSENGERS.

Mr. J. M. McElroy, the general manager of the Corporation Tramways, was a member of the deputation which recently waited upon the President of the Local Government Board, with reference to a superannuation scheme for municipal officers. Addressing Mr. Samuel, Mr. McElroy said: "In Manchester, we have some 5,000 employees, and therefore I have had considerable experience in dealing with questions of this character. We have a thrift scheme whereby the officers contribute 3¾ per cent. of their salary and the Corporation 1¼ per cent. In addition, the Corporation add interest at the rate of 4 per cent. The officers draw their allowance at the age of 65, or in the case of incapacitation earlier. At the present time the Corporation is considering the question of turning this thrift scheme into a superannuation scheme."—In pursuance of their decision to provide more shelters for passengers the Corporation on July 6 explained at a Local Government Board inquiry their scheme to use a small portion of the Southern Cemetery for the erection of a shelter for tramway passengers and the provision of conveniences. The structure is to cost £750, and the outlay will be defrayed by the Tramways and Sanitary Committees.

NOTTINGHAM.

COLLECTING FARES ON THE PLATFORM.

Nottingham tramway conductors are rejoicing at the issue of an order permitting them to collect fares on the platforms of the cars. Hitherto they have not been permitted to take that course.

NEWCASTLE-ON-TYNE.

RECORD RACE WEEK RECEIPTS—A PARLIAMENTARY SUCCESS—EMPLOYEES CONFESS THEIR ERROR.

During the races at Gosforth Park and the fair at Chesham Vale the tramways established another record. From the Saturday to the Thursday a sum of £8,000 was taken. This is larger than the receipts of any other race week since the electrification of the system.—On July 27 a House of Lords' Committee passed the Corporation's bill under which powers were sought to construct additional tramways, and to run motor omnibus services in the urban district of Longbenton and Weetslade. The bill was opposed by the North Eastern Railway Company, who were stated to have spent £500,000 on electrification in the district, and further electrification was in progress. Sir A Butterworth, the general manager of the company, urged that the Corporation could not develop a remunerative traffic to Gosforth Park out of race traffic in competitton with the railway, and that it was outside the Council's province to run omnibuses to the colliery villages. Mr. E. Hatton, general manager of the tramways, presented the estimates of profits on the tramway routes, which would serve a population of 25,000. He spoke of the deficiencies in the railway service to various places, including Killingworth, where he resided, and near which place colliery developments were taking place. Mr. J. B. Hamilton, Leeds tramways manager, gave evidence that he was satisfied that the extensions would be self-supporting. The Committee refused to adopt the clause suggested by the company to the effect that in the event of a loss on the new tramways, owners of any land used as a railway should be assessed for rate only in proportion as to one-fourth of the whole loss.—The Tramways Committee's attendance at the House of Lords' Committee having interfered with the consideration of their employees' demands for improved conditions of service, the union men decided to hand in notices to cease work. Ultimately, additional concessions were agreed upon, including time and a quarter for Sunday work and a 54-hour week, with time and a quarter for overtime. The men, at a meeting on July 26, confessed that their action at a former meeting was based upon a misconception.

PATENT LIST.

Specially abstracted for "The Tramway and Railway World" from the Official Journal of Patents.

*** If the inventions have been communicated the names of the communicators are given below in *italics*.

APPLICATIONS.

The following Applications for Letters Patent have been filed:

14,139 Front guards for omnibuses—J. C. Hunt and J. J. Gibbons.
14,151 Automatic safety locking device and operating mechanism for passenger coaches or motor vehicles—W. Maughan.
14,189 Railway safe-running devices—A. R. Angus.
14,212 Brakes for railway vehicles—W. Kissack.
14,219 Brake shoes for railway vehicles—J. W. Cloud.
14,263 Means of preventing collisions—J. G. Thomson, J. W. Reid, and T. Young.
14,281 Metallic railway ties—J. A. Hyle, T. F. von Dorn, and J. M. Ames.
14,316 Electric traction motors—C. Turnbull, junr., and W. T. Dalton.
14,342 Combined insulating and fastening attachments for rails—W. R. Gorrell.
14,490 Device for preventing side-slipping of omnibuses—F. W. Vinten.
14,683 Tension arrangements for overhead electric conductors—Siemens Schuckertwerke G. m.b. H.
14,964 Fish plates—A. Sutcliffe (*M. E. Olson*).
14,966 Electric railway, tramway, and railless electric vehicles—E. Cross.
14,984 Method of energy supply and control for wagons and trains of electric railways by means of variation in the pressure of supply—Rt. Hon. C. E. H. Hobhouse, W. Slingo, H. C. Gunton, and C. H. Douglas.
15,013 Motor omnibuses—H. B. Weaver.
15,043 Brake shoes for railway vehicles—J. W. Cloud.
15,074 Thermo-electrification of railways, tramways, etc.—W. P. Durtnall.
15,081 Life-guards for motor omnibuses—H. C. Brooks.
15,145 Railway signalling apparatus—O. Kerr.
15,176 Tramway rails—J. Thon.
15,227 Means for preventing collision on railways—T. C. Kerr.
15,279 Fluid-pressure braking apparatus—A. W. Rendell.
15,350 Railway ties or sleepers—E. T. Neily.
15,405 Railway safe-running devices—A. R. Angus.
15,431 Overhead electric locomotion—H. Klincke.
15,449 Rail joint—J. D. Young.
15,539 Method of energy supply to, and control of, electric railway trains by means of variable resistances—Right Hon. C. E. H. Hobhouse, W. Slingo, H. C. Gunton, W. H. Powell and J. R. Kingston.
15,553 Car switch-operating mechanisms—G. A. Errington.
15,586 Tramway rails—G. V. Quibell and J. Coghlan.
15,593 Controlling of railway track points—R. Bell and R. Maguire.

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15,632 Signalling and train stopping apparatus—H. Ballington and L. Shaw.
15,642 Control or operation of railway points—Siemens Brothers and Company, Limited (*Siemens and Halske A.G.*).
15,700 High-speed railways—A. Oates.
15,724 Slack-adjusters for brakes—J. E. Anger.
15,840 Sleepers for permanent way—E. A. W. Phillips.
15,946 Junctions for overhead trolley wires—Cedes Electric Traction, Limited, and K. D. Bowen.
15,988 Railway safe-running devices—A. R. Angus.
15,991 Vacuum-brake casing combination—H. Heatly.
16,121 Apparatus for graduating the braking pressure in compressed-air brakes—W. Hildebrand.
16,272 Tramcar trolley-heads—H. Berry (*E. Strover*).
16,287 Devices for supporting overhead trolley wires—H. W. H. Richards.
16,367 Continuous rails—A. Bagley.
16,397 Rail joints—O. Johnson and C. E. Johnson.
16,453 Tickets and ticket holders—F. L. Hancock.
16,572 Railway vehicles—W. Smith.
16,658 Railway systems—A. L. W. Begg.
16,661 Means for pulling off electrical overhead conductors—Siemens-Schuckertwerke, G.m.b.H.
16,696 Block telegraph signalling apparatus—O. W. Brain and C. A. Hodgson.
16,702 Switches for railways—E. H. Steedman.
16,732 Tramway signals—H. Strohmaier.
16,792 Rail joints—A. F. Borjeson.
16,832 Life-guard—J. Scutt.
16,860 Protective arrangements for electric installations—Siemens-Schuckertwerke, G.m.b.H.
16,869 Electric meters—British Thomson-Houston Company, Limited (*General Electric Company*).
16,880 Apparatus for controlling trains on railways—J. W. Wright.
16,936 Control system for electric installations—Soc. Anon. des Etablissements L. Bleriot.
16,963 Insulating rail joints of electric railways—J. A. Sutcliffe.
17,013 Locomotives—J. M. B. Collings.
17,030 Life-guard for tramcars—Antoine Frere.
17,038 Methods of electric motor control—L. G. Riley.
17,043 Life-guard for motor omnibuses—A. F. Ward.
17,197 Car indicators—J. T. Burgess and W. Oakley.
17,335 Trolley wheels—H. C. Adam and J. C. Adam.
17,381 Automatic brakes for rolling stock—A. W. Broad and P. Swanson.
17,465 Control of electric motors—N. W. Storer.
17,509 Brake mechanism—C. H. Spencer.
17,565 Bogies for railway vehicles—T. H. Craddock (*Burn and Company, Limited*).
17,593 Electrical indicating or signalling apparatus—C. Campbell.
17,620 Railway safe running devices—A. R. Angus.
17,623 Railway signalling devices—W. Jackson.
17,624 Permanent way—J. D. Pearson.
17,662 Pneumatic brakes—F. J. Chapsal and A. L. E. Saillot.

Specifications Published.

1913.

10,803 Electric railway signalling systems—Mouyen.
13,242 Train control apparatus—Murray.
13,243 Electrical train control system—Murray.
14,519 Rail joints—Wattmann and Tudor Accumulator Company.
17,244 Life-guard for motor omnibuses—Knott.
17,946 Car fenders—Nelson and Flateboe.
25,018 Electric railway signalling—Siemens Brothers and Company and Boot.
8,587 Reinforced concrete railway sleepers—Soc. Cementifera Italiana and Sapegno.
13,548 Axle trucks—Peckham and Thomas.
18,287 Guard for tramcars—Cromarty.
21,556 Reinforced concrete railway sleepers—Nesetril.
24,361 Railway sleepers—D'Cunha.
26,018 Apparatus for signalling on trains—Bridge.
14,771 Electric signals for railways—Mutton.
23,943 Railway joint chairs—G. Turton, Platts, and Company and Liddell.
15,516 Auxiliary petrol electric supply for electric cars and vehicles, etc.—Stevens.
18,882 Railway point operating appliances—Lines and Lines.
26,837 Flexible lock joints for car bodies and trucks—Coleman.

1914.

4,009 Rail joints—Anderson.
4,485 Pneumatic brakes—Chapsal and Saillot.
2,790 Wire rope electric insulator couplings—Sunderland.
2,849 Electrical insulators—Von Kando.
553 Car construction—Mills (*Hale and Kilburn Company*).
4,892 Brakes—Lancia.
8,435 Vacuum brake casings—Heatly.

FOR HIGH-CLASS
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TRAFFIC RETURNS.

Colonial and Foreign Tramways.

NAME OF COMPANY.	1913. WEEKS ENDED.					1914. WEEKS ENDED.					AGGREGATE.		
	July 5.	July 12.	July 19.	July 26.	Aug. 2.	July 4.	July 11.	July 18.	July 25.	Aug. 1.	Wks.	1914.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Anglo-Argentine	56.912	55.646	52.809	53.615	55.298	53.771	53.184	53.124	51.035	54.377	31	1,723,230	– 2,831
Auckland ... ... (28 days)	...	...	...	...	...	...	...	...	...	...	—	—	—
Brazilian Street ... (month) Mlrs.	...	...	...	...	...	...	...	...	...	...	—	—	—
Brazilian Traction	93.574	95.453	95.119	95.720	...	95.400	98.000	97.667	97.133	...	4	388.200	+ 8.334
Brisbane ... ...(month)	25.013	...	...	...	...	28.590	...	...	...	...	26	168.975	+ 17.972
British Columbia ... (month) $	680.693	..	...	...	...	660.383	...	...	...	...	52	8,789.287	+297.048
Buenos Aires Port and City (month)	...	...	...	...	...	...	...	...	...	...	—	—	—
Buenos Ayres Lacroze ...(month)	44.078	...	...	...	...	44.139	...	...	...	...	52	534.565	+ 5.988
Calcutta ... ... Rs.	65.410	66.954	66.618	62.978	63.944	68.450	70.336	69.918	70.516	68.806	30	20,83.386	+119.094
Cape Town ... ...(month)	11.560	...	...	...	...	12.742	...	...	...	...	52	155.466	+ 11.249
Carthagena and Herrerias (month)	2.158	...	...	...	...	1.405	...	...	...	...	26	13.796	– 3.535
Cordoba ... ...(month)	13.416	...	...	...	...	13.883	...	...	...	...	13	41.977	+ 1.915
East India ... ...(month)	1.892	...	...	...	...	1.966	...	...	...	...	47	21.090	+ 809
Kalgoorlie ... ...(month)	2.854	...	...	...	...	2.692	...	...	...	...	26	15.522	– 1.704
La Plata ... ...(month)	4.846	...	...	...	...	4.561	...	...	...	...	26	29.244	– 2.328
Lima ... ...(month)	31.210	...	...	...	...	33.310	...	...	...	...	26	207.160	+ 9.021
Madras ... ... Rs.	(2 weeks)	28.492	(2 weeks)	27.430	...	(2 weeks)	32.189	(2 weeks)	29.911	...	30	407.769	+ 32.682
Manaos ... ... (month)	12.530	...	...	...	...	9.868	...	...	...	...	9	20.067	– 5.340
Melbourne ... ...(month)	56.500	...	...	...	...	60.500	...	...	...	...	26	387.500	+ 7.000
Mexico ... ... (month) $	588.780	...	...	...	...	592.463	...	...	...	...	26	3,530.545	+265.005
Montevideo ... ...(month)	28.820	...	...	...	...	28.049	...	...	...	...	35	257.246	– 1.167
Para ... ... (month)	25.373	...	...	...	...	20.914	...	...	...	...	31	150.423	– 30.495
Port Elizabeth ... ...(month)	3.268	...	...	...	...	3.212	...	...	...	...	52	44.931	+ 1.901
Puebla ... ... (month) $	61.300	...	...	...	..	52.000	...	...	...	...	26	380.800	+ 25.800
Rangoon ... ...(month)	4.807	...	...	...	...	4.997	...	...	...	...	26	32.334	+ 982
Shanghai ... ... $	22.764	23.171	23.159	23.192	...	26.800	27.000	26.000	25.400	...	29	718.600	+108.436
Singapore ... ... $	11.509	12.338	12.454	12.486	...	11.453	12.360	11.467	11.520	...	29	356.905	+ 5.622
Toronto ... ... (month) $	815.206	...	...	...	...	861.938	...	...	...	...	26	5.025.926	+370.440
Winnipeg ... ... (month) $	321.037	...	...	...	...	335.012	...	...	...	...	26	2.091.552	+119.178

(*Continued on page 150*).

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TRAFFIC RETURNS—*continued.*

Tramways and Omnibus Undertakings in the United Kingdom.

NAME OF COMPANY OR CORPORATION.	1913. WEEKS ENDED.					1914. WEEKS ENDED.					AGGREGATE.		
	July 5.	July 12.	July 19.	July 26.	Aug. 2.	July 4.	July 11.	July 18.	July 25.	Aug. 1.	Wks.	1914.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Aberdeen Corporation ...	1,711	1,570	1,699	2,041	1,863	1,948	1,889	1,775	2,248	2,016	9	16,028	+ 1,389
Accrington Corporation ...	595	688	574	577	622	617	607	621	627	574	17	10,490	+ 465
Ayr Corporation ...	462	420	578	1,248	595	427	490	533	1,249	612	11	5,779	+ 276
Bath Electric ...	1,195	1,236	1,227	1,286	1,172	1,354	1,255	1,449	1,305	1,168	30	29,256	+ 2,162
Birkenhead Corporation ...	1,492	1,613	1,296	1,276	1,433	1,351	1,297	1,300	1,247	1,304	17½	22,964	- 442
Birmingham Corporation ...	11,913	11,521	11,568	11,379	11,415	13,288	13,007	12,527	12,307	12,261	18	224,752	+ 19,384
Blackburn Corporation ...	1,319	1,387	1,638	1,356	1,498	1,367	1,401	1,389	1,414	1,341	18	25,035	+ 1,208
Blackpool Corporation ...	2,784	3,165	2,529	2,910	3,682	3,089	3,062	2,833	3,051	3,339	18	35,007	+ 4,197
Bolton Corporation ...	2,667	3,112	2,831	2,869	2,840	2,668	2,854	2,859	2,816	2,815	18	51,165	+ 1,791
Bournemouth Corporation ...	2,016	2,244	2,292	2,406	3,528	2,157	2,432	2,374	2,515	3,444	18	41,096	+ 2,339
Bradford Corporation ...	6,282	5,988	6,224	6,006	6,549	6,623	6,427	6,713	7,077	6,714	18	115,196	+ 7,553
Brighton Corporation ...	1,140	1,188	1,182	1,246	1,594	1,385	1,261	1,277	1,265	1,487	17½	20,975	+ 1,487
Bristol	13,261	9,704	9,145	8,925	9,102	10,490	9,925	10,394	9,450	10,010	32½	259,748	+ 20,392
British Electrical Federation ...	54,112	50,951	52,830	54,667	54,701	63,629	61,309	61,663	60,935	59,646	—	—	—
Burnley Corporation ...	1,659	1,631	1,651	1,752	2,487	1,764	1,623	1,662	1,640	1,729	18	30,674	+ 23
Burton-on-Trent Corporation ...	289	287	279	288	...	332	322	309	325	...	17	5,158	+ 350
Bury Corporation	1,423	1,518	1,390	1,430	1,450	1,454	1,446	1,386	1,356	1,348	17½	25,171	+ 364
Cardiff Corporation ...	2,887	2,921	2,872	2,838	...	2,953	2,994	3,042	3,103	...	15	45,786	+ 2,932
Chatham and District ...	1,064	988	1,055	947	917	1,081	1,071	1,085	994	985	30	27,645	+ 604
Chesterfield Corporation ...	274	242	252	250	...	286	268	275	280	...	16	4,628	+ 480
Colne Corporation... ...	345	372	302	311	373	317	363	301	323	300	—	—	—
Cork Electric	613	564	595	579	568	608	614	589	570	516	30	15,131	+ 225
Croydon Corporation ...	1,830	1,628	1,697	1,641	...	1,991	1,832	1,847	1,793	...	16	30,252	+ 2,338
Darlington Corporation ...	251	244	253	266	...	282	274	281	298	...	17	4,537	+ 312
Derby Corporation ...	1,010	986	1,008	990	1,043	1,117	1,087	1,095	1,044	1,040	17½	18,705	+ 1,046
Dover Corporation ...	255	269	280	274	...	284	296	320	301	...	17	4,262	+ 209
Dublin and Lucan ...	(10 days)	254	170	211	198	(10 days)	224	186	186	175	4½	773	- 59
Dublin United	7,710	6,071	6,223	6,823	6,879	7,722	6,475	6,792	6,595	6,191	30	177,596	- 3,343
Dundee City	1,369	1,280	1,295	1,423	1,441	1,375	1,402	1,505	1,463	1,382	10½	14,853	+ 503
East Ham Corporation ...	1,029	921	1,011	941	919	1,157	1,142	1,133	1,091	1,098	17½	19,241	+ 1,417
Exeter Corporation ...	407	377	372	376	398	408	386	397	386	406	18	6,591	+ 427
Gearless Motor 'Buses ...	603	586	608	626	610	497	440	481	483	461	31	14,501	+ 7,245
Glasgow Corporation ...	20,845	19,518	19,676	14,921	18,449	21,615	21,653	19,991	15,126	18,140	8	182,742	+ 9,504
Glossop (Urban Elec. Supply Co.)...	133	134	128	137	140	136	132	135	126	129	31	3,866	- 101
Halifax Corporation ...	2,320	2,142	2,211	2,273	2,307	2,442	2,288	2,298	2,257	2,245	17	38,993	+ 1,970
Hastings and District ...	1,140	1,151	1,212	1,224	1,317	1,228	1,160	1,345	1,262	1,316	30	30,152	+ 481
Huddersfield Corporation ...	2,187	2,126	2,169	2,194	2,276	2,585	2,469	2,362	2,337	2,439	18	62,877	+ 5,004
Hull Corporation	3,088	3,128	3,082	2,974	3,123	3,410	3,229	3,214	3,137	3,118	18	57,017	+ 2,328
Ilford U.D. Council ...	493	460	456	449	443	654	621	607	574	565	17	9,758	+ 1,599
Ilkeston Corporation ...	136	142	133	141	165	133	145	136	129	155	18	2,489	+ 5
Ipswich Corporation ...	518	498	519	516	550	554	536	573	536	544	18	8,868	+ 707
Isle of Thanet	1,129	1,315	1,283	1,413	1,541	1,148	1,335	1,395	1,430	1,599	43	23,961	+ 1,067
Kilmarnock Corporation ...	174	171	179	203	267	176	172	171	193	254	11	2,058	- 79
Lanarkshire	1,844	1,637	1,714	1,845	1,544	2,015	2,255	1,998	2,039	1,537	30	57,581	+ 7,561
Lancashire United ...	1,681	1,578	1,723	1,561	1,705	1,793	1,704	1,709	1,738	1,625	30	49,731	+ 5,001
Leeds City	8,683	8,250	8,519	8,564	8,565	9,127	8,916	9,037	9,035	8,672	18	154,355	+ 6,740
Leicester Corporation ...	2,942	2,806	2,893	3,031	2,911	3,229	3,061	3,098	3,116	2,935	31	89,787	+ 4,614
Leith Corporation... ...	820	756	786	763	717	813	851	847	895	789	11	8,956	+ 537
Leyton U. D. Council ...	1,492	1,328	1,365	1,333	1,372	1,573	1,475	1,503	1,438	1,398	16	24,720	+ 1,327
Liverpool Corporation ...	13,751	17,097	14,650	13,819	13,658	14,537	13,922	13,801	13,710	14,048	30½	403,352	+ 12,723
Llandudno and Colwyn Bay ...	499	546	557	661	683	497	545	528	637	693	35	9,817	+ 10
London County Council ...	43,445	42,350	42,745	41,997	41,410	45,628	44,868	44,773	43,547	42,235	17	759,783	+ 33,992
London General Omnibus...	71,548	66,862	66,505	68,381	68,575	78,066	72,566	76,015	73,731	71,625	31	1,982,031	+ 64,394
London United	7,712	6,571	7,201	7,056	6,997	7,568	6,787	7,056	6,994	6,479	31	191,085	+ 1,910
Lowestoft Corporation ...	219	281	311	309	—	247	287	311	359	—	42	8,372	+ 865
Maidstone Corporation ...	217	202	215	237	226	227	257	242	250	235	18	3,937	+ 286
Manchester Corporation ...	18,239	18,056	19,750	17,605	17,546	19,350	18,830	18,465	17,734	17,159	18	320,854	+ 6,931
Metro. Electric Tramways ...	10,118	9,139	9,668	9,326	9,229	10,621	9,939	10,046	9,617	9,159	31	281,873	+ 6,889
National Steam Car ...	3,253	3,424	3,298	(10 days)	4,836	4,629	4,928	4,933	(10 days)	6,376	39½	165,345	+ 65,550
Nelson Corporation ...	174	242	208	257	262	213	219	199	229	245	17½	3,889	+ 56
Newcastle-on-Tyne Corporation ...	4,616	4,648	4,813	4,666	4,899	5,231	5,357	5,326	5,222	5,318	18	95,846	+ 9,435
Newport (Mon.) Corporation ...	796	772	780	784	831	886	878	1,009	994	838	18	15,326	+ 1,882
New St. Helens and District ...	887	1,038	1,061	837	936	936	924	960	906	853	4	3,757	— 218
Northampton Corporation... ...	630	576	646	561	603	646	606	622	618	618	17½	10,641	+ 368
Nottingham Corporation ...	3,389	3,384	3,365	3,302	3,334	3,668	3,790	3,636	3,553	3,433	17½	61,860	+ 3,404
Oldham Corporation ...	2,234	2,626	2,357	2,357	2,397	2,419	2,403	2,353	2,471	2,241	19	44,052	+ 2,246
Portsmouth Corporation ...	2,790	2,585	2,587	2,504	—	2,850	2,877	3,327	2,925	—	17	42,895	—
Preston Corporation ...	870	1,145	864	885	902	907	912	919	936	872	18	16,272	+ 248
Provincial...	2,418	2,302	2,349	2,382	2,532	2,381	2,442	2,443	2,433	2,520	43	82,719	+ 4,534
Reading Corporation ...	731	701	753	704	727	774	747	790	759	724	17	12,811	+ 872
Rhondda Tramways ...	1,226	1,199	1,200	1,270	1,225	1,270	1,243	1,278	1,263	1,246	30	37,353	+ 1,893
Rochdale Corporation ...	1,674	1,846	1,686	1,706	1,787	1,730	1,751	1,664	1,640	1,682	18	29,594	+ 533
Rotherham Corporation ...	965	970	989	1,056	1,218	1,043	1,055	1,054	1,080	1,181	18	18,779	+ 919
Salford Corporation ...	5,358	6,219	5,263	5,282	5,657	5,490	5,501	5,318	4,964	5,116	18	94,830	+ 109
Sheffield Corporation ...	7,542	7,519	7,590	7,515	7,389	7,899	7,975	8,030	7,793	7,541	18½	147,479	+ 7,509
Southampton Corporation...	1,413	1,354	1,424	1,435	1,458	1,552	1,386	1,524	1,549	1,446	17	24,175	+ 1,409
Southend-on-Sea Corporation ...	1,089	1,090	1,151	1,185	1,251	1,272	1,305	1,463	1,446	1,444	18	19,358	+ 3,418
South Metro. Tramways ...	1,028	879	883	896	916	1,247	1,166	1,196	1,154	1,092	31	33,840	+ 8,574
South Shields Corporation ...	744	734	806	756	858	869	867	883	858	881	17½	14,458	+ 1,748
Sunderland Corporation ...	1,532	1,505	1,588	1,520	1,845	1,708	1,710	1,655	1,629	1,698	18	27,500	+ 1,424
Swindon Corporation ...	174	170	132	152	164	192	196	154	166	169	17	3,064	+ 289
Torquay Tramways ...	685	667	780	832	859	747	742	846	768	826	30	16,945	+ 562
Tramways (M.E.T.) Omnibus Co. ...	5,826	5,815	6,663	7,845	8,007	10,454	9,885	10,159	9,525	9,356	31	277,828	+184,604
Tyneside Tramways and Tramroads ...	830	505	569	561	580	907	571	604	596	566	5	2,404	+ 66
Wallasey Corporation ...	1,341	1,470	1,335	1,324	1,454	1,520	1,442	1,440	1,454	1,528	17½	24,029	+ 1,742
Walsall Corporation ...	644	613	622	619	638	665	648	627	631	631	31	19,305	+ 430
Walthamstow U.D. Council ...	790	711	752	759	792	945	855	887	818	812	18	15,172	+ 1,817
Warrington Corporation ...	482	544	423	436	430	474	471	501	486	433	17	6,741	- 85
West Ham Corporation ...	2,885	2,718	2,854	3,008	2,668	2,984	2,909	2,980	2,858	2,773	17	50,363	+ 2,401
Wigan Corporation ...	1,433	1,562	1,518	1,433	1,453	1,460	1,437	1,519	1,438	1,448	17	26,272	+ 539
Wolverhampton Corporation ...	1,163	1,139	1,149	1,197	1,378	1,214	1,187	1,064	1,038	1,337	19	20,569	+ 354
Yorkshire (West Riding) ...	1,432	1,495	1,411	1,460	1,559	1,456	1,465	1,494	1,518	1,512	31	45,239	+ 1,217

Electric Railways.

NAME OF COMPANY.													
Central London	4,777	4,508	4,528	4,296	4,142	4,877	4,665	4,444	4,417	4,260	31	153,116	- 2,378
City and South London ...	2,710	2,671	2,718	2,648	2,599	2,534	2,562	2,350	2,425	2,480	31	82,703	- 5,243
Liverpool Overhead ...	1,858	2,379	1,858	1,829	1,840	1,783	1,741	1,719	1,695	1,814	31	53,212	+ 497
London Electric	13,580	13,165	12,990	12,550	11,660	13,070	13,060	12,670	12,425	12,120	31	432,635	+ 1,900
Mersey	2,147	2,491	2,350	2,137	2,106	2,070	2,101	2,118	2,149	2,115	31	69,071	- 289
Metropolitan	18,968	19,359	18,676	18,312	17,879	19,124	19,571	18,818	18,469	18,224	31	568,081	+ 42,280
Metropolitan District ...	13,488	13,016	12,706	12,757	12,379	13,107	13,054	12,829	12,583	12,542	31	406,451	+ 353

TRAMWAY DIRECTORIES.

A useful feature of this issue is the directory of electric railways and electric tramways which will be found among the advertising pages. This directory contains the names of the chief officals and the principal particulars relating to each undertaking.

The directory is revised as occasion requires, and is the most up-to-date and comprehensive list published.

The Tramway & Railway World can be obtained, post free, at the following rates:
For the United Kingdom—
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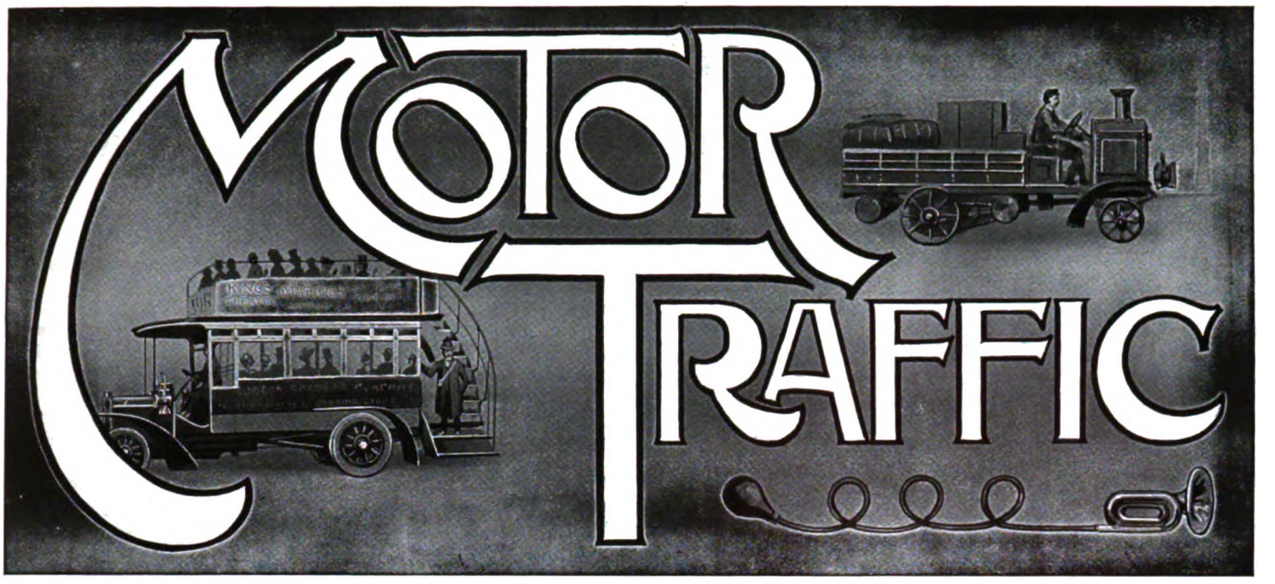

A great deal of misconception will be removed by the discussion at the road section of the recent annual meeting of the Institution of Municipal and County Engineers, when Mr. F. Wood, borough engineer of Fulham, submitted a paper on "The Economies of Modern Methods of Road Construction." The misunderstanding arose from a statement which Mr. W. J. Hadfield, the road surveyor of Sheffield, made before a House of Commons Committee on the Sheffield Corporation Bill. It will be remembered that the Corporation strongly opposed the claims made by outside authorities for a contribution towards the cost of maintaining the roads on which the Sheffield tramways department sought powers to run their motor omnibuses. Mr. Hadfield then gave evidence that omnibuses had been running in Sheffield for the last 18 months, that 30,000 miles had been run during the year, and that he had not found the tar macadam damaged by that traffic. Speaking at the meeting of the Institution, Mr. Hadfield observed that from the correspondence he had received he gathered that the latter portion of his evidence had caused a good deal of surprise. The discussion which followed this remark at the Institution's meeting shows that the astonishment was given rise to by Mr. Hadfield's apparent failure to explain to the Committee what he meant by the term tar macadam. Mr. Wakelam, the Middlesex County engineer, who presided over the Institution's meeting, asked for enlightenment, and Mr. Hadfield replied that the material he uses is slag tar macadam laid on the old macadam surface in three layers—the bottom, 2¼ in.; the middle, 1½ in.; and the top, ½ in., well sprinkled with chippings for the benefit of the horse traffic. Usually there is from 3½ in. of tar macadam on an old macadam bed of 4 in., and in some cases 6 in. to 8 in. Asked by Mr. Wakelam how long a road so treated had been under omnibus traffic, Mr. Hadfield replied that the period was 16 months. This drew a rejoinder from the chairman that such a result was quite contrary to the experience of a great many of the members. Probably no road engineer has had to deal with heavier traffic from motor omnibuses and all kinds of vehicles than has fallen to the lot of Mr. Wakelam, but unfortunately in his subsequent summing up of the discussion on the several papers submitted to the Conference he did not give the members the benefit of his experience as to the best materials to use in meeting the varying degrees of traffic, except that some good had come out of tar spraying of the roads in all directions in the kingdom. That system is useful only for ordinary motor car traffic.

Mr. Wakelam indicated one direction in which benefit is to be derived in the case of new roads when he mentioned that in the Act which Middlesex County Council have obtained for constructing a new western road out of London, powers have been granted to prevent interference with the road other than for resurfacing. All sewers, water and gas mains, electrical cables, and everything for the use of the residents, will be laid in the footpaths. Save in the case of sewers, there is probably no reason why the same course could not be followed on other roads when reconstruction is necessary to meet motor omnibus traffic. In London we have seen water men pulling up such a road, comprising wooden blocks laid on 9 in. of concrete, a few weeks after it has been completed. Perhaps the most helpful observations, as regards heavy traffic, made during the discussion, fell from Mr. F. Wood, borough engineer, Fulham, Mr. H. P. Boulnois, of Westminster, and Mr. J. S. Brodie, of Blackpool. The first-named speaker mentioned that excellent results had been obtained with what may be termed "tarred concrete," which is made by taking up the macadam material and mixing it with a special mixture of tar. This process gives an exceedingly strong concrete, costing not more than 1s. 9d. per superficial yard. Roads so treated are used by traction engines, steam and petrol tractors, motor omnibuses, etc., and it is confidently anticipated that no repairs will be necessary for at least 10 years. Mr. Wood also referred to the good results obtained from bituminous paving in lieu of the more expensive wood paving. Mr. Boulnois affirmed that according to the circumstances of the case there is room for asphalt, artificial asphalt, and tar macadam, and that there were many cases in towns where wood paving must be cheaper and certainly better in many ways to lay than bituminous mixtures. He also pointed to the use of improved granite setts at the bottom of Tottenham Court Road, where they are laid choc-a-block, and no rumbling noise is made by the traffic. Mr. Brodie touched the crux of the road-paving question when he said that unless a road has a good foundation the best crust will sooner or later prove a failure, and that with better foundations and impervious crusts road costs can be lowered. An important announcement was made by Mr. W. H. Grieves, surveyor to the Sutton Council. The Surrey

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MOTOR TRAFFIC.

town has this year been invaded by the motor omnibus, and it has long been on the route of heavy commercial traffic out of London. Two years ago the water-bound macadam road in High Street was laid with mexphalte. The traffic does not appear to have disturbed the road, while the vibration, which was very bad in adjoining property under the old conditions, has entirely disappeared.

HALIFAX OMNIBUS RESULTS.

The accounts of Halifax Corporation Tramways for the year ended March 31 last include the following statement of the revenue and expenditure under the motor omnibus revenue account for the same period:

INCOME.

	£	s.	d.
By Traffic Revenue:			
Passengers—Wainstall section	1,411	16	3
„ Siddal section	1,116	3	7
Private 'buses	3	12	6
Vouchers and tokens	15	0	5
Luggage and parcels	4	9	4
	2,551	2	1
By deficiency transferred to net revenue account	172	8	1
	£2,723	10	2

EXPENDITURE.

	Per Mile Run. d.	£	s.	d.
Traffic Expenses:				
Motormen and conductors—wages	2·483	707	7	10
Cleaning 'buses	·183	52	0	8
Licences	·054	15	6	0
Uniform and sundries	·110	31	7	6
Extra 'bus for one week	·102	29	4	5
	2·932	835	6	5
General Expenses:				
Third party and other insurances	·333	94	15	10
National Insurance contributions	·023	6	10	0
Carriage and sundries	·143	40	16	3
Proportion of rates and administration	·175	50	0	0
	·674	192	2	1
General Repairs and Maintenance Expenses:				
Bodies	·200	56	17	11
Chassis, gearing, etc.	·354	100	15	2
Ignition	·080	22	16	4
Engine and water circulation	·257	73	6	6
Oiling and lubricating	·233	66	7	11
Lighting fittings	·070	19	17	3
Garage and various	·235	67	2	1
Tires	2·250	641	0	10
	3·679	1,048	4	0
Petrol	1·967	560	12	3
Lighting of 'buses	·010	3	0	7
Interest on loan	·296	84	4	10
	9·558	£2,723	10	2

TOTTENHAM URBAN DISTRICT COUNCIL have decided to equip their fire brigade with motor appliances, and propose to seek powers to borrow the necessary money.

WALSALL TRAMWAYS COMMITTEE have recommended the Council to purchase a number of motor omnibuses for service in that town. Power to run these have been applied for in the Corporation's bill now before Parliament.

MORE LEYLANDS FOR WESTMINSTER.—The Highways Committee of the Westminster City Council have accepted the tender of Leyland Motors, Limited, for the supply of two petrol motor wagons. An interesting arrangement has been included in this contract whereby Leyland Motors, Limited, undertake to maintain the wagons for a period of either 5, 8, or 10 years, as the Council may determine, at £50 per wagon up to five years, £55 per wagon from then up to the eighth year, and £60 for the last two years.

INSTITUTION OF AUTOMOBILE ENGINEERS.

THE TOUR IN BELGIUM.

During the visit of the Institution of Automobile Engineers to Belgium from July 15 to 18 all the Belgian manufacturers did their utmost to make the reception of their English confrères as interesting, useful, and enjoyable as possible. At the works of the Minerva Motor Company, in Antwerp, the notice of the visitors was specially drawn by Mr. de Jong to the use which is still made of machinery which might be considered out of date, but any disadvantange there might be would appear to be compensated for by the very low rate of wages which is paid to machinists in Belgium, averaging about 5d. per hour.

At the works of the Fabrique Nationale, in Liege, the visitors were received by Monsieur A. Galopin, the engineer. The testing laboratory is on a magnificent scale; in fact, throughout the works in Belgium this department forms a very important feature. At these works the party were photographed, the group being reproduced on this page. At the stamping works of Messrs. Derihon, in Liege, the laboratory proved a great source of interest, and a number of tests were carried out on various machines. The visit to the works of the Societe Cockerill, at Seraing, was one rather of general interest to the engineer.

Automobile Engineers' Visit to Belgium.

Messrs. Dyle and Bacalan's works, at Louvain, revealed many interesting features, the pressing of chassis frames, pistons, back axle casings, and other automobile parts, and the drawing of tubes being shown.

During the tour of Messrs. Mabille and R. Pelgrims' works, at Mariemont, special attention was paid to the casting of steel wheels for motor omnibuses, the whole of the operations being explained while a special exhibition of test pieces had also been arranged. The carriage building works of Messrs. Van den Plas proved of great interest. On the conclusion of the visit the members were driven in automobiles to the Bois de la Cambre, where they were entertained by the Chambre Syndicale de l'Automobile et du Cycle de Belgique to luncheon, the chair being taken by the president, Comte Jacques de Liedekerke.

Throughout the whole of the visit remarkable courtesy and hospitality was shown to the party. The Minerva Company, in addition to providing luncheon, arranged for special tramcars from the hotel to the works. The F. N. and Derihon Companies provided a large fleet of motor cars for the same purpose. Messrs. Mabille and R. Pelgrims had arranged for special trains in order to avoid the inconvenience of two changes between Brussels and Mariemont, while the Chambre Syndicale, in addition to entertaining the party to luncheon, provided a large fleet of cars to drive the guests round Brussels and to the field of Waterloo, but beyond all that was the really sincere welcome which the visitors were accorded.

SOUTHAMPTON AND OMNIBUSES.—The Tramways Committee recommended, on the advice of the manager, that three motor omnibuses should be used as feeders to the cars, and that a visit should be paid to towns where such vehicles are in use, with a view to deciding the best type of omnibus to be adopted.

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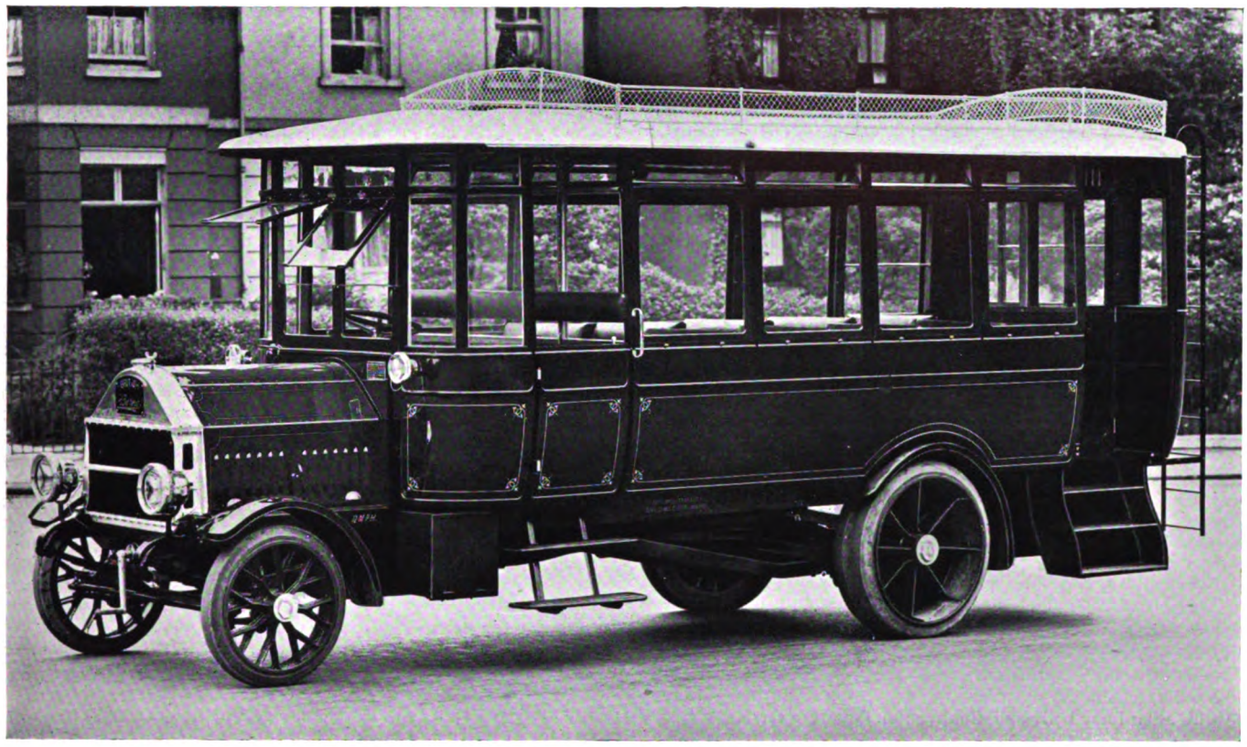
MOTOR TRAFFIC.

BRITISH BERNA OMNIBUSES FOR SOUTH WALES.

The illustration of the British Berna single-deck omnibus which appears on this page, is one of a number to be supplied to the South Wales Transport Company for service in the Swansea district. As will be seen, this represents an exceptionally handsome type of vehicle and one well adapted as an "all weather" machine. The seating arrangements provide accommodation for 32 passengers, 30 in the body of the vehicle and two in the driver's seat, which is enclosed in a vestibule. The entrance is at the rear of the vehicle, special arrangements being made in the design of the body for ventilation without draught, and as the vehicle is fitted with a complete C.A.V. lighting set, the comfort of the passengers has been well considered. The bodies are being built by Messrs. Brown, Hughes, and Strachan, of Park Royal. The British Berna chassis is of particularly sturdy construction and is specially designed for service on the trying roads usually found in South Wales and similar districts. The 35-40-H.P.



British Berna Omnibus.

engine is an excellent example of the heavy duty type. The cylinders, which are separate, have a bore of 120 mm. with a stroke of 140 mm., while the massive crank shaft has five bearings of ample size, each lined with anti-friction metal. The valves are interchangeable and are operated by spur gearing driven by the cam shaft. Protective covers enclose both the valve stems and springs. The system of lubrication adopted by the designers clearly indicates the most careful attention to this all-important detail, with the result that perfect lubrication is assured to all working parts. An efficient cooling system, by means of a large centrifugal pump driven from the magneto shaft, is provided, a notable feature of this being the large dimensions of all pipes and waterways. The rack and pinion drive, which has already been described in these pages and which has made such an excellent reputation for Berna chassis, both in this country and abroad, is again in evidence, and will ensure good and regular service for these vehicles.

It may not be generally known that after undergoing full load tests, each chassis, before being passed for delivery, is driven from the works at Newcastle-on-Tyne to the London head-quarters at Avonmore Road, Kensington, where the machine is again thoroughly overhauled before being handed over to the customers.

Bradford City Council have decided to purchase a 3-ton steam wagon for use in the cleansing department.

BERNA MOTORS.

As stated in our issue of July 25, the action between the British Berna Motor Lorries, Limited, and John Yarwood and Company, Limited, was settled by mutual agreement, each party paying their own costs. The dispute had reference to the selling rights of the Swiss-built Berna chassis. A number of agreements had been entered into from time to time between the Swiss company and Berna Commercial Motors, Limited, and it was claimed by the plaintiff company that the benefit of these agreements had been assigned to them upon the formation of the British Berna Motor Lorries, Limited. They, therefore, sought for an injunction restraining John Yarwood and Company from selling the Swiss Berna chassis in competition with the British Berna machine now being manufactured in this country. The defendants contended that the agreements entered into with Berna Commercial Motors, Limited, could not be assigned to the British Berna Company, and had in fact been broken by this and other acts, and further that a new agreement made with Berna Commercial Motors, Limited, in August, 1913, without their disclosing the fact that British Berna Motor Lorries, Limited, had been formed, made the way clear for the independent sale of the Swiss machines in this country. The matter was further complicated by the allegation that Mr. John Yarwood had negotiated with the Swiss company for the independent selling rights of the Swiss machine, during the time he held his position as director and manager of the British Berna Motor Lorries Company. After the case had been opened at some length, and Mr. Grimwade, the managing director of Hudsons Consolidated, the company which had arranged the finances of the English Berna companies, had been examined and cross-examined by the defendants' counsel, negotiations for a settlement were entered into, and this was finally reached on the morning of the third day of the trial Under the settlement the selling rights of the Swiss Berna chassis have been given to the British Berna Motor Lorries, Limited, who will now be able to supply both the Swiss and the English-built Berna chassis. Before the case was withdrawn, in stating the terms of the settlement, counsel referred to the allegations made against Mr. Yarwood, and made it clear that these were entirely without foundation, as the negotiations with the Swiss company for the selling rights were not entered upon until after Mr. Yarwood's resignation had been accepted by the directors of the British Berna Company in July, 1913.

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MOTOR TRAFFIC.

MOTOR VEHICLES AT THE ROYAL SHOW.

Although mechanical traction was well represented amongst the implement exhibits at the seventy-fifth annual show of the Royal Agricultural Society of England, there was a distinct falling-off in the number of exhibitors when compared with the previous shows at Bristol, Doncaster, etc. Moreover, the steam vehicles outnumbered the petrol machines to such an extent as to lead one to suppose that for agricultural work at least the former type of machine still holds the favour of the majority. Some exceptionally fine examples of steam wagons and tractors were shown, each of the well-known manufacturers being represented. Amongst these were included:

Aveling and Porter, of Rochester, who staged no less than eight different machines, including an entirely new type of lorry on "Continental" solid tyres. Messrs. Aveling and Porter also staged a worm-driven 4-cylinder petrol wagon.

Clayton and Shuttleworth, of Lincoln, had a most comprehensive display of machines, including an example of the firm's 3-ton and 5-ton steam wagons. A notable feature of these wagons is that in each case the boiler is of the Belpair type, built to work at a pressure of 200 lb. per sq. in. The 3-ton wagon is fitted with artillery wheels and runs on Continental T pattern solid tyres.

William Allchin, Limited, Northampton, exhibited two steam wagons as well as a single-cylinder traction engine. The 5-ton model was of their standard overtype with locomotive pattern boiler and a double-crank compound engine fitted with two speeds. The 3-tonner was fitted with a high-sided body and mounted on Dunlop tyres.

Chas. Burrell and Son, Limited, of Thetford, Norfolk, showed four examples of their well-known loco-boiler type machines, two tractors, and two wagons.

Fodens, Limited, of Sandbach, staged a traction engine and two steam wagons, a 5-ton with built-up steel wheels and steel tyres, and a 3-ton machine, fitted with Polack tyres. The latter was fitted with a low-sided hinged body, and was built to the order of the Tynemouth Gas Company.

R. Garrett and Sons, Limited, of Leiston, included in their exhibit two examples of their patent superheated steam wagons, a 5-tonner mounted on Polack rubber tyres, and a 3-ton machine on "Continental" T pattern rubber tyres. Special attention has been paid to the braking of these vehicles.

Mann's Patent Steam Wagon Company, of Leeds, had a machine of exceptional interest to municipal authorities, in the form of a convertible steam roller wagon, specially designed for rolling tar macadam, and patching all kinds of road surfaces. It is provided with a large single back roller, and can readily be converted from an ordinary lorry to a water cart.

The Yorkshire Commercial Motor Company, of Leeds, showed two examples of the "Yorkshire" steam wagon, a 6-tonner fitted with a patented mechanically-operated tipping gear, and a 3-ton machine fitted with a flat lorry body and Continental T pattern tyres.

Leyland Motors, Limited, as is usually their practice, had both steam and petrol vehicles on view, and their exhibits, four in number, made a most interesting display. An excellent example of the firm's fire-fighting appliances was shown in the form of a 500-gallons machine fitted with a 55-H.P. engine. This was fitted with Continental solid rubber non-skid tyres. A 30-H.P. char-a-bancs capable of seating 27 passengers was mounted upon the Leyland 2½-ton War Office subvention chassis, and was interchangeable with a flat lorry body. Polack solid rubber tyres were fitted to this machine. A 5-ton petrol lorry was also shown. This was fitted with a 48-H.P. engine, and was mounted upon rubber tyres supplied by Peter Union Tyre Company. A most interesting vehicle from the municipal point of view was the vacuum ejector and tank machine, mounted upon the Leyland standard 6-ton steam wagon, built to the order of the Nottingham Corporation. The capacity of the tank is 1,000 gallons, and the working vacuum is created by means of a steam ejector. This can be readily created in some four or five minutes. The suction pipe is then dropped into the gully, and the semi-liquid matter is immediately drawn into the tank. A small crane is fitted for the purpose of lifting the suction hose. The exhaust manhole is fitted at the rear end of the tank, a steel conveyor being provided for the purpose of emptying the solids from the tank. This is operated through a bevel and worm drive connected up to the engine in a similar manner to the Leyland tipping gear.

The Daimler Company, Limited, of Coventry, had four machines on view, two tractors and two lorries. The enormous dimensions of the largest of the two tractors compelled the attention of all interested in mechanical traction. It was fitted with a 6-cylinder sleeve valve engine, with a bore and stroke of 150 mm., developing 105 H.P., a small donkey engine being fitted in order to start up the big engine. The driving wheels are 8 ft. in diameter, with 2 ft. 9 in. face. The driving gear for all purposes is designed to take the maximum power from the engine, the draw bar pull being 12,000 lb. Two speeds forward and a reverse are arranged for, these being 3·2 and 2 miles per hour. The total weight of the machine is 12 tons, and it is specially designed for breaking up virgin soil, being able to take a 21-furrow plough over average ground. The largest of the two lorries was also designed for Colonial service. It was fitted with a 50-H.P. engine, 125 mm. bore, and 160 mm. stroke, governed. The wheels were 4 ft. 3 in. in diameter, with 12 in. face steel tyred. The minimum ground clearance was 14 in. The 2-ton lorry was fitted with a 30-H.P. engine, 75 mm. by 140 mm. Both machines were arranged for four speeds, and had worm-driven back axles.

CROYDON AND OMNIBUS COMPETITION.

EFFORTS TO MOVE THE GOVERNMENT TO ACTION.

Mr. T. B. Goodyer's annual report on Croydon Corporation Tramways was considered at the July meeting of the Council. The total revenue was £87,026. The gross balance was £17,947, and the net balance £1,362. The gross receipts for the preceding two years were £92,464 and £94,430, the working expenses being £66,218 and £61,650, as against £69,743 last year. The gross balance was equal to 6·3 per cent. on the capital outlay, and, after payments of interest and sinking fund charges, etc., the net balance was equivalent to 4 per cent. The total capital expenditure stood at £284,847. The sum of £73,236 had been applied to the reduction of debt, equivalent to 25·71 per cent. The reserve and renewals fund amounted to £42,352. Compared with 1912-13, traffic receipts had decreased by £5,617, or 6·2 per cent.; miles run had increased by 150,371, or 5·68 per cent.; passengers carried had decreased by 1,276,265, or 6·22 per cent.; working expenses had increased by £3,525, or 5·32 per cent.; percentage of expenses to traffic receipts, 82·12 per cent. (an increase of 8·99 per cent.); gross balance had decreased by £9,206, or 33·9 per cent.; and the net balance had decreased by £9,454, or 89·3 per cent.

The decreased net balance was due to the following causes: Severe motor omnibus competition and unfavourable weather conditions, £5,617; increased miles run, £687; increase in car repairs, £443; increase in power costs due to additional miles run, £1,662; increase in permanent way repairs, £649; increase in amount set aside for income tax, £82; sundry increases (less decreases), £314; total, £9,454. The number of cars in stock was 75.

The following summary shows the average number of omnibuses operating in the borough during the past year: Quarter ended June 30, 1913, weekdays 75, Sundays 144; September 30, weekdays 96, Sundays 162; December 31, weekdays 90, Sundays 144; March 31, 1914, weekdays 85, Sundays 131. In order to meet to some extent the competition referred to, a considerable increase in tramcar miles has been run. Out of every 20s. earned 7s. 10¾d. was spent in wages, and in addition, 7·09 per cent. and 3·03 per cent. of the revenue earned was spent on repairs to permanent way, and on rates and taxes respectively. No similar expenditure was incurred by motor omnibus operators. In June last Croydon Corporation unanimously adopted a resolution requesting the Government to pass such legislation as would place motor omnibus companies on terms of equality with regard to public obligations with the municipal tramways authorities in the metropolitan area. Mr. Goodyer communicated the resolution to managers of tramways in the metropolitan area, and the following tramway authorities had passed a similar resolution, viz., East Ham, West Ham, Bexley, Leyton, and Walthamstow.

Alderman Allen, in moving the adoption of the report, said the mileage increased by 150,000, and 1¼ million less passengers were carried. It was hoped that the outcome of the appointment of a Select Committee, promised by the President of the Local Government Board, would be that heavy motors and omnibuses would pay a heavier duty. The report was adopted, Councillor Lighton speaking highly of the work of the manager.

OMNIBUSES FOR TORQUAY.—It is stated that the Torquay Tramways Company are about to institute services of road motor vehicles in districts not served by the tramways.

SOUTHEND CORPORATION OMNIBUSES.—The tramways department have inaugurated omnibus services from the Kursaal to Westcliff. Tilling-Stevens and Straker-Squire single-deck vehicles are employed.

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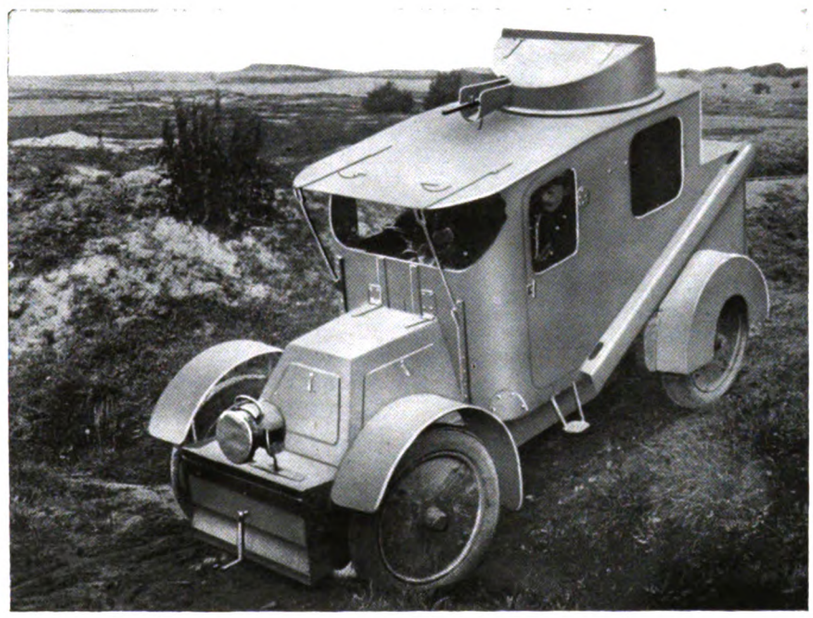
MOTOR TRAFFIC.

THE WAR AND MOTOR TRACTION.

By a Special Correspondent.

All too soon the war in which this country and the rest of Europe are engaged has given the opportunity for a test to be given in real earnestness to the steps that the various countries have taken to utilise road motors. On the Continent many such vehicles as the Russian armoured car, illustrated on this page, carrying a machine gun, will be brought into use, and we may be sure that our own army will not be lacking in similar facilities for securing the rapidity of movement upon which so much depends. The scanty reports which came through of the German invasion of the neutral state of Luxemburg showed that motor cycles were to the fore. The German and French armies in peace had brought their motor vehicle departments to a more complete state of development than any other country, both for the transport of stores, ammunition, and troops.

The British Army have not been neglectful of the advantages of motor traction, a mechanical transport branch of the Army Service Corps having been formed four years ago, while early in the last decade a Motor Volunteer Corps, now known as the Army Motor Reserve, came into being. Its personnel is provided by members of the Royal Automobile Club and other motoring organisations, and its work in transporting staff officers at Army manœuvres has proved of great service. In the carrying of despatches members of the Auto-Cycle Union and the auto-cycle branch of the Motor Union have rendered yeoman service. Almost every regular infantry battalion utilises motor cyclists, and they also form a considerable portion of the strength of the cyclist battalions of the Territorial Force. Their value is so great that civilian motor cyclists are being specially enlisted. Many hundreds of motorists have placed their cars at the disposal of the country, and the Royal Automobile Club and the Motor Union are receiving names of members who will offer the services of their cars or their services with their cars either for home or foreign service.



A Russian Military Armoured Motor Car.

In this article, we are chiefly concerned with the development of the commercial motor vehicle for military work. Only a few months ago the Scottish Automobile organised their pleasure and commercial car membership for military service in time of need. A few years ago, Mr. A. du Cros, M.P., and other members of the Panhard Motor Company and the Dunlop Tyre Company, with the aid of other motorists, carried out with entire success the transport of a battalion of the Foot Guards from the Crystal Palace to Hastings. Shortly after that demonstration a Motor Transport Committee was formed in connection with the War Office, in order to develop by means of a subsidy scheme the manufacture of commercial vehicles for military transport work. For two years past the advantage of these vehicles has been fully demonstrated at manoeuvres by the conveyance of supplies for a distance of forty miles in advance of depots formed on the railways. In this work the motor vehicle registration scheme, which is distinct from the subsidy plan, has proved its efficiency. A number of London firms had registered all of their motors and drivers for service in a national emergency such as the present conflict, and during the first week in August they fulfilled their obligations. The subsidy vehicle scheme enlisted the support of a number of the leading commercial vehicle manufacturers, who have constructed wagons and lorries to the specifications of the War Office and submitted them to the official tests on the road. The disposal of these models to purchasers who are attracted by the offer of the subsidy, may be said to have made satisfactory progress.

The War Office began, during the first week in August, to exercise their powers of impressing into the service of the Crown all the motor and horse conveyances that they required, but it has to be recorded to the credit of the London General Omnibus Company and the allied omnibus companies, that for a week before this was done a large number of their omnibuses stood ready in all the garages, with drivers in waiting, to carry out the wishes of the naval and military authorities. The motor omnibuses are proving even more useful than the omnibus horses of London did as gun teams in the South African war. The requisitioning of commercial motor vehicles has been on an extensive scale, and many of them are destined to accompany the British Expeditionary Force to the Continent. It will be remembered that during Italy's war with Tripoli motors proved to be the salvation of the invaders.

As late as July 18 last a demonstration of the utility of motor vehicles for the conveyance of field guns over a long distance to the coast was given by Earl Fitzwilliam, a member of the Royal Automobile Club, who is also the commandant of the West Riding Royal Horse Artillery of the Territorial Force. The battery are armed with 13-pounder guns, and considerable doubt was felt as to whether the wheels of the chassis used would be capable of withstanding the strain imposed on them. Ordinary 6-cylinder 30-h.p. Sheffield-Simplex cars, were employed. Rough bodies were fitted to carry the gunners, the battery staff, spare stores, and other equipment, whilst special arrangements were made for attaching the gun and limbers and the ammunition wagons to the chassis. The battery was ordered to proceed with the utmost despatch to Waltham, near Grimsby, to meet an invader, and under the scheme of operations the railway bridges were assumed to have been destroyed, and the distance of the journey was too great for horse traction.

The guns were conveyed a distance of 80 miles in 3 hours 40 minutes, an average speed of 21 miles an hour. General Sir Hubert Plumer, K.C.B., of the Northern Command, expressed himself as surprised and delighted to see how well the chassis had borne the strain. He congratulated Earl Fitzwilliam on the success of the experiment. Not only would it have necessitated a three days' march to cover the same distance, but it was proved in the course of the gun manœuvring that the motor vehicles could be placed with as much precision and with much greater speed than by using a well-drilled team of horses.

Traction Men and the War.—Reports from all over the country show that a considerable proportion of the men employed by tramway and motor omnibus undertakings have been called out for military service during the great crisis which has arisen in international affairs. A certain number of these men are reservists, while others, of course, belong to the territorial force. In all cases the response seems to have been prompt and hearty, and the managers of the tramways and omnibus companies have to accommodate themselves as best they can to working with reduced staffs. In the case of the London General Omnibus Company, upwards of 2,000 men of all grades have been called up, over 50 per cent. being drivers. This large percentage is due to the fact that in addition to the reservists a large number of the men had engagements as military transport drivers. In view of this serious depletion of their staff, it is remarkable that the alterations in the motor omnibus services have been practically unnoticed except upon the few routes where the services have been temporarily withdrawn. In arranging the reduced services, it is obvious that careful consideration was given to the transport facilities other than by motor omnibus.

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MOTOR TRAFFIC.

MOTOR TRAFFIC NOTES.

THE DAIMLER COMPANY, LIMITED, have recently obtained contracts for the supply of motor omnibuses to the Corporations of Coventry, Reading, Nottingham, and Leicester.

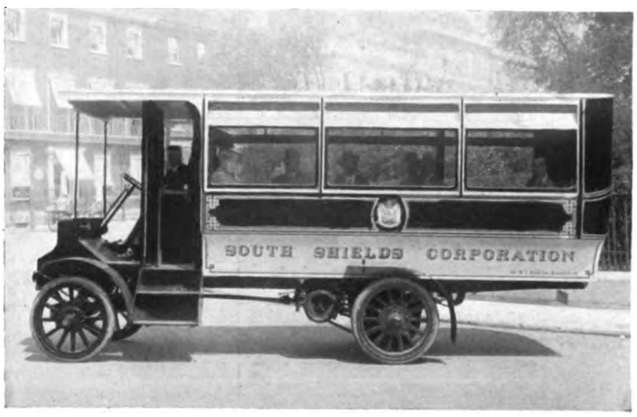
CARSHALTON URBAN DISTRICT COUNCIL.—At a recent meeting of the Council it was decided to apply to the Local Government Board for power to borrow the money for the purchase of a motor fire engine.

WEST HAM CORPORATION have decided to purchase an Edison accumulator 1-ton vehicle for use in the electricity repair department. The machine will be fitted with a flat platform lorry body, upon which will be mounted a telescopic tower ladder of a removable pattern.

EDISON COMMERCIAL VEHICLES.—Messrs. Drake and Gorham, Limited, have accepted the sole agency for Edison Accumulators, Limited, for Lancashire and Cheshire for commercial electric vehicles. Mr. T. H. Rigg, of the Edison Company, has joined Messrs. Drake and Gorham as departmental manager.

OMNIBUS SPEED IN DERBYSHIRE.—Derbyshire County Council are asking that proceedings should be commenced against drivers of motor omnibuses on the routes round Derby, who exceed the 12 miles limit. Their action is due to the damage which is being done to the roads, especially when the cars are running at a high rate of speed.

CHESTERFIELD'S PAYMENT FOR THE USE OF THE COUNTY ROADS.—The Chesterfield Corporation have agreed to pay the Derbyshire County Council during the current financial year one halfpenny per



Edison Electric Omnibus for South Shields.

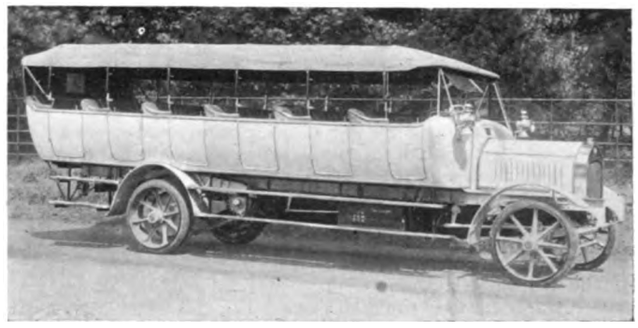
car-mile run by their motor omnibuses on the county roads. Under their Act the Corporation have to make a contribution in respect to the upkeep of the main roads.

OMNIBUSES FOR NOTTINGHAM.—The Tramways Committee have placed an order for two motor omnibuses, which will be put into service between Gregory Street, Lenton, and Dunkirk. Gregory Street will be the terminus of the Derby Road tramways, which are now in course of construction. When this route is completed the new lines from Sherwood to Daybrook and Arnold will be laid.

BURNLEY'S LEGISLATIVE PROPOSALS.—The Council have called for a report on the advisability of applying for Parliamentary powers (*a*) to run motor omnibuses generally throughout the borough; (*b*) to run motor omnibuses along the present tramway routes outside the borough; and (*c*) to remove broken-down locomotives and other obstructions on the tramway lines, and to recover the cost from the owners.

MOTOR OMNIBUSES IN CALCUTTA.—The Government of Bengal evidently anticipates that not only will motor 'buses become the general means of locomotion in Calcutta, but that they will be used extensively for advertisement purposes. They have accordingly drawn up a schedule of positions for the exhibition of advertisements, and order that a distinct line should be drawn between the colour of the advertisements and that of the route boards so as not to confuse the passenger into getting on the wrong 'bus.

DAIMLER AGRICULTURAL TRACTOR.—The Daimler Company have arranged to demonstrate the capabilities of their new 40-H.P. tractor at Lincoln from August 7 to 21. The machine has been expressly designed for farm work, such as ploughing, harvesting, haulage work, threshing, etc. All interested are invited to communicate with either Messrs. Wm. Foster and Company, Limited, Perth Road, Lincoln, or the Daimler Company, Limited, Coventry, who will be pleased to make the necessary arrangements for conveyance from Lincoln station to the scene of the trials.



Albion 29-Seated Char-a-Bancs for the Scottish Motor Traction Company, Edinburgh.

NEWCASTLE-ON-TYNE CORPORATION OMNIBUSES.—A number of motor omnibuses are already in successful operation as feeders to tramway routes of the Tyneside city, and when sanction is given to the powers applied for in the bill now before Parliament, other localities will be provided with similar means of communication. Members of the Tramways and Light Railways Association who inspected the garage during the recent Congress at Newcastle were afforded evidence that the general manager of the tramways intends to take full advantage of the powers provided in the bill.

MANCHESTER'S OFFER FOR ROAD MAINTENANCE.—At the last monthly meeting of the committee of the Commercial Motor Users' Association consideration was given to the motor omnibus proposals of Manchester Corporation Bill, 1914. The question of making a grant to support opposition to the proposal of the Manchester Tramways Committee to pay 2d. per mile run to certain authorities in respect of projected motor omnibus services was considered, and correspondence was reported with the Manchester, Liverpool, and Counties Commercial Motor Users' Association. It was resolved that a donation of £20 should be made to support the opposition.

IMPERIAL TRAMWAYS COMPANY'S MOTOR SERVICES.—Sir George White presided at the annual meeting and moved the adoption of the report, which recommended the payment of a dividend of 4 per cent. on the ordinary capital. Adverting to the motor omnibus services at Middlesbrough, he said the company would also be running a number of high-class touring torpedo chars-a-bancs. They intended developing still further the motor business in Middlesbrough, Stockton, and Thornaby, by providing a service of thoroughly well-equipped motor cabs and cars. The present were only an instalment of the motor services in contemplation. With regard to the investment in the London and Suburban Traction Company, the directors of that company explained in their report that their omnibus fleet was not in full

Albion Char-a-Bancs for Bannockburn.

service until August last, and they anticipated considerably increased revenue in future years. The traffic returns showed that for 25 weeks this year their omnibuses had earned an increase of £164,000, so there would appear to be every reason why the anticipations of the directors of the London and Suburban Company should be fulfilled.

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THE

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NOTICES.

All Communications and Advertisements for next week's issue should be received not later than 3 p.m. on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

CITY OF BRADFORD.

TENDERS FOR THE SUPPLY OF TRAMWAY TICKETS.

The Corporation of Bradford are prepared to receive tenders for the supply of Tramway Tickets for a period of not exceeding three years. The approximate consumption is 50,000,000 per annum. The standard specimens can be inspected, and a copy of the schedule obtained, on application to the Manager of the Stationery Department, Town Hall, Bradford, on payment of half a guinea, which will be returned upon receipt of a *bona-fide* tender.

The contract will be let subject to the Fair Contracts Clauses of the Corporation.

Tenders, endorsed "Tender for Tramway Tickets," must be sent to me not later than Wednesday, September 30, 1914.

The Corporation do not bind themselves to accept the lowest or any tender.

FREDERICK STEVENS,
Town Clerk.

Town Hall, Bradford, August, 1914.

CITY OF MELBOURNE, AUSTRALIA.

SUPPLY OF INSULATED COPPER CABLE.

Tenders are invited for the supply of—

5,280 yds.	7/16	S.W.C.	Single	Conductor	Lead	Covered Cable.
1,760 yds.	7/14	,,	,,	,,	,,	,, ,,
1,760 yds.	19/15	,,	,,	,,	,,	,, ,,
880 yds.	0.15	sq. in.	,,	,,	,,	,, ,,
880 yds.	0.3	,,	,,	,,	,,	,, ,,
140 yds.	0.75	,,	,,	,,	,,	,, ,,

Copies of specification, conditions of tender and of contract and form of tender can be obtained on application to the undersigned.

Such application must be accompanied by a deposit of 5s., which will be returned on receipt of a *bona-fide* tender.

Tenders to be sent to the undersigned, endorsed "Tenders for Insulated Copper Cables," and must be received by them not later than 12 noon on Wednesday, August 26, 1914.

The Council reserves to itself the right, but does not bind itself to accept, the whole or any portion of any tender.

Messrs. MCILWRAITH, MCEACHARN AND CO. PPTY. (LTD.),
Billiter Square Buildings, London, E.C.,
Agents for the Melbourne City Council.

BURY CORPORATION.

The Corporation of Bury invite tenders for the supply of Materials for the Permanent Way and Overhead Equipment of 1½ miles of Tramways.

On and after August 8, 1914, specification and form of tender may be obtained from the Tramways Manager, Market Place, Bury.

COUNTY OF LONDON.

The London County Council invites tenders for the Reconstruction of Motor-Generators in the Tramway Southern Sub-stations.

The specification, bills of quantities, form of tender, etc., may be obtained from the Clerk of the Council, County Hall, Spring Gardens, S.W., after payment to the Cashier of the Council of £2. This amount will be returnable only if the tenderer shall have sent in a *bona-fide* tender, and shall not have withdrawn the same. The contract document may be inspected before the payment of the fee.

The person whose tender is accepted will be bound by the contract to pay wages at rates not less, and to observe hours of labour not greater, than the rates and hours set out in the Council's list. Particulars of the Council's Standing Orders as to its conditions of tender and contract are given in every issue of the *London County Council Gazette*. No tender received after 11 a.m. on Tuesday, September 8, 1914, will be considered.

The Council does not bind itself to accept any tender.

LAURENCE GOMME,
Clerk of the London County Council.

County Hall, Spring Gardens, S.W.

COUNTY BOROUGH OF OLDHAM.

ELECTRICITY WORKS.

The Oldham Corporation Electricity Committee invite tenders for the supply, delivery, and erection of Storage Battery, Reversible Booster and Switchgear.

Copies of the specification, prepared by Mr. Robert Blackmore, A.M.I.E.E., can be obtained from the Joint Electrical Engineer and Manager, Mr. Fred L. Ogden, Electricity Works, Greenhill, Oldham, on payment of two guineas, to be returned by the Corporation on receipt of a *bona-fide* tender.

The Corporation do not bind themselves to accept the lowest or any tender.

Tenders must be sent to the Electricity Works at the above address on or before Monday, August 24, 1914, endorsed "Storage Battery."

J. H. HALLSWORTH,
Town Clerk.

Town Hall, Oldham,
August 4, 1914.

SOUTH INDIAN RAILWAY COMPANY, LTD.

The South Indian Railway Company, Limited, are prepared to receive tenders for the supply of :—

Carriage Fittings (metre gauge), Wrought Iron and Steel, Hardware, Screws, and Sundries.

Specifications and forms of tender may be obtained at the Company's offices.

Tenders, addressed to the Chairman and Directors of the South Indian Railway Company, Limited, marked "Tender for Carriage Fittings (Metre Gauge)," must be left with the undersigned not later than 1 o'clock on Wednesday, August 26, 1914.

The Company is not bound to accept the lowest or any tender.

A charge, which will not be returned, will be made of 20s. for each copy of the specification.

Copies of the drawings may be obtained on payment at the offices of Robert White, Esq., M.Inst.C.E., Consulting Engineer to the Company, 3, Victoria Street, Westminster, S.W.

By order, V. E. DE BROE, M.Inst.C.E.,
for Managing Director.

Company's Offices,
91, York Street, Westminster, S.W.,
August 4, 1914.

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COUNTY BOROUGH OF WIGAN.

GRANITE CUBES AND SETTS.—TRAMWAY RAILS.

The Corporation of Wigan invite tenders for the supply of Granite Cubes and Setts and Tramway Rails.

Forms of tender and bills of quantities may be obtained from Mr. A. T. Gooseman, Borough Engineer, King Street West, Wigan.

Tenders, endorsed "Granite Setts" or "Tramway Rails" (as the case may be), to be sent to me not later than Monday, the 24th instant.

The Corporation do not bind themselves to accept the lowest or any tender.

William Henry Tyrer,
Town Clerk.

Town Clerk's Office, Wigan,
August 12, 1914.

POSITIONS VACANT.

NEWCASTLE AND DISTRICT ELECTRIC LIGHTING CO., LTD.

The above Company invites applications for the post of Switchboard Attendant. Applicants must have had experience in E.H.T. three-phase and L.T. D.C. three-wire power station working and in the running of rotary converters.

Commencing wages 30s. per week, rising to 36s.

Applications, stating age and experience, accompanied by two testimonials of recent date, to be forwarded, endorsed "Switchboard Attendant," to the head offices of the company, 38, Grainger Street West, Newcastle-on-Tyne.

STRETTON URBAN DISTRICT COUNCIL.

ELECTRICITY DEPARTMENT.

The Council invite applications for the position of Shift Engineer, at a commencing salary of £2 per week. Preference will be given to applicants who have held a similar position in a D.C. combined traction, lighting and power station, and who have also been accustomed to dealing with traction and lighting feeder boosters. Further particulars may be had from Mr. R. Rowland, Resident Engineer.

Applications, accompanied by not more than two recent testimonials, to be addressed forthwith to the Chairman of the Electricity Committee, Electricity Station, Chester Road, Stretford.

Geo. H. Abrahams,
Clerk to the Council.

Council Offices, Old Trafford.

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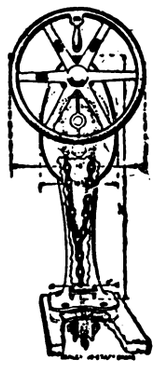

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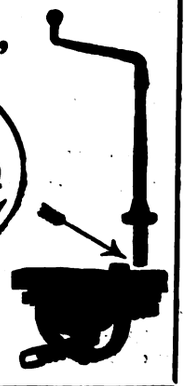

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THE
Tramway and Railway World

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SATURDAY, AUGUST 15, 1914.

THE "OCEAN"
ACCIDENT AND GUARANTEE CORPORATION, LTD.,
IS THE
PREMIER INSURER OF TRAMWAYS
HEAD OFFICE:
MOORGATE STREET, LONDON, E.C.

SOME EFFECTS OF WAR ON TRAMWAY INDUSTRIES.

Some of the effects which the calamity of a European war is likely to produce on the tramway industries of this country are already capable of prediction. It may at once be said that the results are not likely to be nearly so prejudicial in this country as they probably will be on the Continent. But to take things in order, in the term tramway industries we include both the working of tramways and the businesses of manufacturers and contractors in the tramway field. Under the first of these heads, there can be little doubt that there will be some arrest of the continual growth of traffic receipts. A certain proportion of the population, owing to the dislocation of trade with the Continent and to marine war risks, are being thrown out of employment, or are put on short time, or have less remunerative employment than before. All these people will use the tramways less than they usually do. Then quite a considerable proportion of tramway patrons belong to the Reserve and Territorial Forces. These having been called up, their members are away from their ordinary occupations, and when they do use the tramways they are in very many places being carried free. This is a very laudable concession on the part of tramway authorities, but, like the other circumstance of unemployment, it will tend to lower tramway receipts. In both cases, also, the dependents of the wage-earners are likely to use the tramways less. On the other hand, working expenses will probably be somewhat lower. As long as the British Navy holds the seas, the price of materials and stores, except of any articles which have hitherto been largely obtained from the Continent, is not likely substantially to advance. There can be no fear of coal going up; rather the reverse is possible, owing to the check on exportation to the Continent. The wages bill may show an appreciable decrease, because of the large number of employees whom the tramway owners of this country are proud to liberate on good terms for service in the Reserve and the Territorials. Though these men are treated generously by their employers during their absence and will be reinstated on return, the total amount paid weekly in tramway men's wages is for the present likely to be smaller. In some, if not most, towns the car mileage run is being somewhat restricted, thus leading to a saving in working expenses all round. At the same time, it will generally be found that a slightly reduced car mileage will be sufficient for the present requirements of the public. On the whole, there does not appear to be any ground for alarm as to the financial results to tramway owners, though care and watchfulness are essential. Thanks to our insular position and our Fleet, there is no prospect of paralysis of local transportation. Under the second head, that of the businesses of manufacturers and contractors in the tramway field, it is probable that circumstances will be found much more favourable than to some appeared likely on the first blush when Britain declared war. For the manufacturing and commercial interests of this country the circumstances are, of course, unprecedented since the industrial epoch based on the use of mechanical power began, and, indeed, the only analogous, though scarcely similar, set of conditions is that associated with the Napoleonic wars. Even then British trade was flourishing compared with that of Continental countries. That partly arose from Napoleon's delusions as to the principles of international commerce, but chiefly from the fact that the British Navy swept the seas. Our Fleet is still fully capable of that. While it is true that so long as hostilities last no sea power can help us to trade with Germany, it is plain that our commercial intercourse with America, North and South, will remain intact, and there is every reason for hoping that the Mediterranean route to and from the Far East will be kept open. Even now we have a promised renewal of regular services with Denmark and Norway. The short of all this is, in regard to British manufacturers who have been partially dependent on raw materials from the Continent, that they are now unable to get such supplies from Germany. But America and the East are open to them both for import and export, and they will also find that a good deal of stuff produced in Germany can be got in England, perhaps at a slightly higher price, but of much better quality. It accordingly appears that the home market for electric traction plant, permanent way, cars and their equipment, and the great mass of accessories need not be depressed at all. In fact, in some directions, the war ought to benefit home manufacturers considerably. Competition from the Continent is dead. Not only so, but those industries in European countries which, bolstered up by protective tariffs, have unfairly competed with our manufacturers, will take a long time to revive after peace is restored. With any fair measure of success in the war for the nations which are opposing the Prussian tyranny, we may look forward to a trade boom in this country of quite exceptional magnitude.

Proposed Omnibuses at Rotherham.—Rotherham Town Council have adopted a recommendation that the tramway manager should prepare for the consideration of the Electric Light and Tramways Committee a detailed report showing the estimated cost of running motor omnibuses in districts recommended by him, along with the probable revenue in respect of each suggested route. In regard to a proposed motor omnibus service to Catcliffe and Treeton, it was agreed to instruct the Town Clerk to inform Rotherham Rural District Council that the Corporation were prepared, without prejudice, to pay ⅜ of a 1d. per omnibus mile run in respect of a motor omnibus which the Corporation intend to run to the places named.

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TRAMWAY EMPLOYEES AND THE WAR.

Reports from all over the country show to what a considerable extent the employees of tramway undertakings are either Reservists or members of the Territorial Force. These bodies having been called out, the tramway staffs have been to some extent depleted, but it is satisfactory to note that the services are maintained without public inconvenience; in some instances indeed there has been no reduction in service. The following notes indicate the condition of things in some of the towns of the country.

As was briefly mentioned in our issue of last Saturday, out of a total of 12,000 employees of the tramway department of London County Council about 700 have been called up to the Reserve. Of the employees of the London General Omnibus Company 2,000 men have been called up, half of whom are drivers. Both the omnibus and the tramway services have been slightly curtailed and excess passengers are now allowed at all hours of the day in the lower saloons of the tramcars. While in some parts of the country the August Bank Holiday traffic receipts show some falling off, it is noteworthy that those for the London County Council tramways made a record figure, namely, £9,622, being fully £1,000 more than on August Bank Holiday last year. The increase may partially be accounted for by the fact that great numbers of people travelled by tramway to Westminster and Victoria, as these were centres of popular resort during the excitement preceding the declaration of war. It is announced that members of the military and naval forces and ambulance corps and Red Cross nurses in uniform may travel free on the County Council's cars.

A special meeting of the London County Council was held on Tuesday last for the purpose of passing a report by the General Purposes Committee on matters arising out of war having broken out with Germany. In this report the Committee stated that they had considered what steps should be taken supplemental to and in concert with Government action in arranging for the continuance in London of all necessary services and the performance of such additional services as might be necessary. Various proposals were put forward, especially in connection with the schools and education work. Administration during the summer recess, it was proposed, should be carried out by a special committee with full power to take action. It was recommended also that deputy chairmen of certain committees should be named, as the services of either the chairmen or vice-chairmen were, or might be, required by the Government. The General Purposes Committee had also considered the arrangements to be made with regard to the allowance of pay to officers and employees who had been called up by Government as members of the Reserve or Territorial Forces. The Government had not yet decided as to the course to be taken in this respect as regarded civil servants and other Government employees, and the Committee thought that the matter could well be left to the special committee whose establishment was recommended. The General Purposes Committee had, however, guaranteed half pay to all men now in the service of the Council, who at the time of mobilisation were members of the Reserve or Territorial Force, and who had been, or might be, called up to active service and who were married, or had dependent relatives. They had also guaranteed that all officers and employees who had been called up should be reinstated at the conclusion of the war without loss of seniority or qualification for pension or superannuation allowance.

A number of the London General Company's omnibuses have been temporarily taken over by the military authorities for transport purposes, and the same statement applies to the omnibuses of the Norwich Electric Tramways Company. These omnibuses had not begun to run at Norwich and were on the point of delivery. A considerable number of the employees of the company have been called out for service.

In Glasgow it is reported that 600 tramway employees who were Reservists or Territorials have been called up. In consequence holiday bookings have been cancelled, and orders issued for the recall of men on vacation. Mr. Dalrymple, the general manager, has issued a notice expressing a hope to see all these men back again very soon to fill their old positions. It has not been found necessary to make any material change in the service of cars. One peculiar feature of the situation in Glasgow was that owing to the prolonged bank holidays it was necessary to pay the police in coppers obtained from the tramway department.

In Leeds some 250 employees of the tramway department have been called up for active service. The following arrangements have been made for payments to the men's dependents in addition to their ordinary service pay:—Single men with dependents, 5s. per week; married men, 5s. per week to the wife and an additional 2s. per week for each child under 15 years of age.

The Leeds tramwaymen, in view of the war, have withdrawn their application for an increase of wages. The application would in the ordinary way have had to be finally decided in November next.

In Sheffield the calling out of the Reserves and the Territorials has taken 140 men from the tramway staff. By rearrangement in regard to holidays a full service of cars has been maintained.

In Cardiff over 100 tramway employees have been called up.

Newcastle-on-Tyne tramways have had 120 men called up for service in the various divisions. The question of providing for their dependents is now under the consideration of the City Council.

Ipswich Tramways and Electricity Department has given leave of absence to 33 men. The question of support for their dependents has not yet been decided.

In Liverpool, where about 400 men have joined the various Government forces, the Corporation has decided to grant leave of absence during the war and to reinstate the men on their return without loss of position or emoluments. Each man is to receive such sums as, together with the pay he receives from the Government, will make up full salary or wages.

In Birmingham the tramways department has lost 340 men, Reservists and Territorials. Although the details have not been definitely settled, it is understood that the Corporation have decided to make allowances to the dependents of each of the men that have been called up.

Reports from quite a number of towns show that arrangements have been made for carrying troops, whether Regulars or Territorials, on the tramcars free.

LONDON THROUGH RUNNING.

Through County Council Bookings with the Underground.

The Highways Committee reported to the London County Council on July 28 that the Metropolitan Electric Tramways Company, Limited, having given three months' notice, expiring on July 31, 1914, to determine the agreement with the company and the Middlesex County Council relative to the through services between Euston Road and Alderman's Hill and Enfield, negotiations had taken place between those bodies and the Highways Committee. The Committee presented a report recommending the adoption of a new agreement. The Euston Road and Enfield service is to be continued for a further period of two years, and 15 cars are to be lent to the company for a further period of 12 months. As very large developments are taking place outside the county of London boundary, there is a prospect of the earning value of the lines increasing more rapidly than those in London. Additional through services are to be instituted, *via* Manor House, until August 1, 1916. Through running is to be instituted for the first time *via* Archway Road, Highgate. The company, as a condition for this departure, insisted on through booking also being instituted between their tramways and the Underground Electric Railway at the Archway Tavern. The Committee did not think this course would be prejudicial to the Council's interests, as they were satisfied that there would be a general increase in the receipts from the combined tramways due to the extra facilities given by through running. If the through booking arrangements with the railway are found to be mutually satisfactory at the expiration of six months, similar through bookings are to be instituted at Finsbury Park railway station. Through bookings are to be instituted between the through tramway services and the services run by the London Electric Railway Company, between the outlying tramway termini and Euston Road, and between such other points as may be hereafter agreed. The through running *via* Seven Sisters Road is to be continued. A through service is to be instituted from New Southgate to Moorgate Street, instead of to Aldersgate Street. In connection with the loan of 15 cars to the company for the existing through services, the company had asked for the annual renovation to be carried out by the Council at the expense of the company. The work, which is estimated to cost £660, is to be done by direct labour.

PROTECTION AT STOPPING PLACES.

Sheriff Gardner Millar, K.C., sat at the Appeal Court, Glasgow, on July 27, to hear a petition lodged by the Corporation of Glasgow for confirmation of the by-laws framed by them for the regulation of vehicular traffic in the streets of the city. The principal by-law deals with traffic at tramcar stopping places. It enacts that "When a tramway car is standing at a tramway stopping place, as such stopping place is indicated by a notice on the side of the street, every driver of a vehicle who intends to pass on the left or rear side of such car shall draw up immediately before arriving at such stopping place until the roadway is clear of passengers entering or leaving such car." Objections were raised to this and other by-laws by Mr. J. Hunter, on behalf of the Scottish Horse and Motormen's Association, Glasgow. In reply to the Sheriff, Mr. M'Kenzie (for the Corporation) said he presumed that with reference to by-law 10 a reasonable construction would be put on the words "clear of passengers." He also understood that the clause made it imperative that a vehicle should stop not as long as the car remained at a stopping place, but merely so long as to allow time to passengers to get to or from the pavement to the car. Mr. Hunter said it seemed strange that the Corporation, while conferring with the Automobile Club and also, he thought, with the contractors, did not think it worth while to take that association into their confidence. With all these by-laws it was not, as a rule, the masters that were affected, but the carters. The by-laws would never have been heard of but for the new danger on the streets from motor cars. The Court adjourned for the purpose of parties interested holding a conference with a view to adjusting the terms of by-law 10 in a manner which would meet with the approval of all parties.

The B.E.A.M.A. and Government Orders.—Immediately after the outbreak of present hostilities, the Council of the B.E.A.M.A., on behalf of the members, wrote to the Admiralty and the War Office offering to use every endeavour towards expediting Government contracts. The Council have no doubt that their action will meet with the hearty support and approval of every member of the Association.

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MISCELLANEOUS NEWS AND NOTES.

New Cars for Aberdeen.—On Tuesday Aberdeen Tramways Committee inspected six new cars which are now being put into service. They also agreed to recommend the Corporation to buy another six cars.

Messrs. S. Wolf and Company, of 115, Southwark Street, London, have placed upon the market a new electrical grinding machine for tramway rails which embraces a number of features of interest to all concerned in the maintenance of tramway track.

"Mazda House News."—The July-August issue of "Mazda House News" contains much interesting matter and is attractively got up. The articles, which are copiously illustrated, refer to Mazda lamps as made by the British Thomson-Houston Company in all styles, and the half-watt lamp receives special attention.

A Rotherham Extension.—The Rotherham Council at their August meeting agreed that a tramway from Westgate to Effingham Square, authorised under a Provisional Order of the present year, should be constructed in accordance with the powers obtained. It was also agreed to apply to the Board of Trade for sanction to the Council borrowing £3,760 for the construction of the tramway.

Thermit, Limited, inform us that, owing to the large stocks of material in hand, the war in Europe will not interfere in any way with their business, and that quotations previously given will in all cases stand good. In order to remove any misapprehension that may influence business negotiations with Messrs. Thermit, it may be useful to point out that the company and the entire administration and personnel of the business is British.

Messrs. Doulton and Company have issued a finely illustrated new catalogue of insulators showing a very large selection of standard types of cable insulators, etc., both in stoneware and in cream glazed vitreous porcelain of Lambeth manufacture. Many of the types have not been shown in the firm's previous catalogues, and the list has been brought up-to-date. In view of the fact that those who have previously purchased foreign made goods will not now be able to get a supply from the Continent owing to the war, Messrs. Doulton are prepared to offer immediate supplies of their insulators and are making special arrangements in their factory to increase the output.

Burdett Road Horse Trams.—On Wednesday the old horse service of cars running from the West India Docks to South Hackney was discontinued. This particular line has presented an exceptionally difficult problem for the London County Council, as the proposed electrification on the overhead system has been steadily vetoed by the three local Borough Councils through whose areas the line runs. The Council has been losing £8,000 a year on the old horse lines, and now the war has come to the aid of the tramway authority in practically dealing with the problem, it being announced that the service is discontinued owing to the commandeering of so many of the horses for military purposes.

West Ham and the Traffic Board Question.—In his annual report on West Ham Corporation tramways Mr. J. S. D. Moffet, the manager, refers to the representations which have been made by a conference of the London tramway systems urging the Government to give effect to the recommendations of the Select Committee with regard to setting up a new department which should combine the traffic duties of the Home Office, the Local Government Board, and the Board of Trade. It is to be regretted that no definite action has yet been taken. Should a new Traffic Department eventually be formed, or road maintenance grants be made by the Road Board owing to the destruction of the roads by heavy motor vehicles, tramway undertakings in the London district would no doubt receive considerable benefits. In West Ham, largely owing to traction engine and motor lorries and omnibuses, £22,034 was spent on track maintenance, compared with £14,061 and £8,799 respectively for the two preceding years.

A Question of Indicators.—At the last meeting of Salford Town Council Mr. Bratherton asked the chairman of the Tramways Committee whether the committee would consider the advisability of going back to the old system of indexing the cars instead of the numerical system that had lately been introduced. "S 17" for instance did not give a clear indication of the particular route along which the car was going to travel. They could not learn the route along which the car was going to travel without asking the motorman or the guard. Alderman Linsley said the people required educating before they would understand a new system such as that now in operation. When they were educated he thought they would fall into it. They were having a little handbook printed, which would explain all details with regard to the running of the cars, and this book would be circulated very largely. Mr. Bratherton said that it would only make confusion worse confounded if they had to read books on the matter. The old system was all that was necessary.

Oldham Tramway Administration.—The question which had been raised in Oldham by Councillor Low in regard to the administration of the tramways department were brought to a satisfactory conclusion at a meeting of Oldham Town Council on August 5. A report by the Tramways Committee on the subject was presented, and showed that in the opinion of the committee the charges were trivial or disproved. After a discussion the report was adopted by a large majority. Alderman Isherwood, the chairman of the Tramways Committee, in winding up the discussion, stated that Dr. Low's charges were made on hearsay; they arose from the venomed spleen of a disappointed man, a discharged employee. The Tramways Committee might not be the best committee to conduct this inquiry, but it was certainly the primary committee. Surely at a time like this in the history of the country they had other things to be concerned about than these charges. It was the doctors who had been working this thing. They had been to see him at Colwyn Bay to plead for the reinstatement of this man. It was a plot by the doctors to coerce the Tramways Committee. Not a medical man in the town should coerce him. His reply to the charges was in the report of the committee, and he asserted that the tramways department was never in so satisfactory a condition as to-day.

Assistant Car Conductors in London.—Mr. Bowerman, in the House of Commons, asked the Home Secretary a question as to whether he was aware of the order of April 21 last, authorising the licensing of assistant tramway conductors, had aroused much indignation among the men at present employed on metropolitan stage carriages; and, in view of the expressed opinion of the men concerned (which had already been brought to his notice) that the order in question was likely to prove detrimental to the travelling public and to the men at present employed on metropolitan stage carriages, as well as to the boys themselves, whether he was prepared to withdraw the order in question. Mr. M'Kenna has issued the following reply:—Two deputations from different unions representing the workers have been received at the Home Office, of which one opposed and the other supported the order. The appointment of assistant conductors is in the interests of the travelling public, and the Commissioner of Police informs me that where introduced it has proved of much advantage and has been much appreciated by the men themselves. As at present advised, I am not prepared to withdraw the order.

CONTRACTS AND ORDERS.

The Daimler Company, Limited, have recently obtained contracts for the supply of motor omnibuses to the corporations of Coventry, Reading, Nottingham, and Leicester.

St. Pancras Borough Council have awarded the British Niclausse Boiler Company the contract for four boilers, complete with Niclausse stokers, superheaters, and economisers, fitted with forced and induced draught plant, chimneys, and other accessories. Each boiler is to be capable of evaporating 40,000 lb. of steam per hour from feed at 120 deg. F., at a steam pressure of 220 lb. per sq. in., superheated 250 deg. F. The first boiler is to be erected by the end of the year, and this will be done notwithstanding the present international situation.

PERSONAL.

Mr. G. H. Hume, the chairman of the London County Council Highways Committee, has been appointed a member of the Special Committee appointed at last Tuesday's meeting of the Council to deal with emergency matters till the Council's ordinary meetings resume in October.

Wigan Town Council has approved a recommendation of the Tramways Committee to appoint the traffic manager, Mr. Frank Buckley, to the position of general manager. Mr. Buckley has been manager of the traffic department for nearly two years, and is now to be placed in control of all sections of the undertaking.

FINANCIAL REPORTS AND MEETINGS.

Hadfields, Limited.—Interim dividend of 1s. per share, tax free, on the ordinary shares is to be paid on the 22nd inst. out of the profits of the half-year ended June 30. A year ago the dividend was at the same rate.

Lanarkshire Tramways Company.—At the twenty-sixth ordinary general meeting held in London on August 7, Mr. A. R. Monks, who presided and moved the adoption of the report, stated that the result of the half-year's working showed that the revenue was £50,595, and the expenses £32,650, and after providing for contributions payable to local authorities, interest on debentures, and, including the balance brought forward, there was an amount available of £15,935. Out of this the directors recommended a dividend at the rate of 6 per cent. per annum for the half-year on the issued share capital and to carry forward to new revenue account £5,045. The revenue for the half-year showed an increase of £7,145, and the expenses an increase of £7,995, as compared with the corresponding half of 1913.

Tyneside Tramways and Tramroads Company.—The report of the directors for the half-year ended June 30, 1914, states that the surplus of receipts over expenses is £5,824, which, with the balance brought forward from last half-year, makes a total of £6,212, and after deducting interest on debentures, loans, etc., there remains an available balance of £5,200. This profit the directors propose to appropriate as follows:—In the payment of dividend on the preference shares at the rate of 5 per cent. per annum (less income-tax), £601; in the payment of dividend on the ordinary shares at the rate of 3 per cent. per annum (less income-tax), £2,008 10s.; in placing to the credit of reserve for renewals, depreciation, and other contingencies, £1,200. This will increase the fund to £17,526. There is carried forward to next half-year £1,060. The traffic receipts show an increase of £986, as compared with the corresponding period of last year.

Cardiff Corporation Tramways.—The annual reports for the year ended March 31 last of Mr. J. Alcock, city treasurer, and Mr. A. Ellis, tramway engineer and manager, have been submitted to Cardiff Tramways Committee. They show that the net surplus was £18,594, a decrease of £1,732 compared with the previous year. A sum of £6,946 has been transferred to the depreciation fund, and of the balance £4,800 goes to the relief of rates, leaving unappropriated £6,848. The committee agreed to vote a further £4,800 to the relief of rates. The traffic receipts amounted to £142,041, being an increase of £12,776.

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Blackpool Corporation Tramways.—The report by Mr. C. Furness, general manager of Blackpool Corporation tramways, for the year ended March 31 last, shows that the total receipts were £84,707, being an increase over the previous year of £10,631. The working expenses were £43,486, an increase of £3,805. The gross surplus of £41,311 has been allocated as follows:—Interest and sinking fund charges, £16,758; permanent way renewal fund, £10,000; reserve fund, £2,552; leaving a surplus for rates of £12,000. The gross surplus of £41,310 is equivalent to approximately 13.3 per cent. on the capital outlay, and after providing for interest and sinking fund charges, the available surplus represents 7.8 per cent. on the capital outlay. The increase in the receipts is the more remarkable seeing that there was no Easter in the financial year, while the preceding financial year embraced two Easters. The receipts per car mile were no less than 18.91d., compared with 16.93d. in the previous year. The number of cars is 84, of which 24 are of the toast-rack type.

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 60 of the principal undertakings of the United Kingdom for the week ended August 1 give total receipts of £243,132, or £551 less than in the corresponding week last year. The total length of track was 2,863 miles, or 24 more than for the corresponding week. Receipts were at the rate of £84 18s. 5d. per track mile, a decrease of 10s. 6d. as compared with the corresponding week of last year.

THE BRITISH ELECTRICAL FEDERATION.

The traffic statement for the week ended August 7, 1914, shows that the receipts from tramways and railways amounted to £49,599 as compared with £53,760 in the corresponding week last year, and from omnibuses £19,774, as compared with £13,629, making a total of £69,373, as compared with £67,389. The tramway and railway route mileage was 429.82, as compared with 428.47. Upon such of the services as were working both last year and this year the receipts show a decrease of £4,589 upon the week.

NOTICE.

Owing to the war and the consequent dislocation of the markets no quotations of prices of copper and aluminium or of coal are available. The last quoted copper and aluminium prices will be found in our issue of July 25, and coal prices in our issue of August 1.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return.		Aggregate		
		1912-3.	1913-4.	Wks.	1913-4.	Increase or Dec.
Anglo-Argentine	Aug. 5	£55,298	£54,377	31	£1,723,230	— £2,831
Auckland..... (28 days)	June 5	20,007	20,919	49	247,311	+ 6,331
Ballarat and Bendigo	June 21	3,178	3,158	12	11,240	+ 95
Brazilian St. Rly. Mlrs.	May	44,820	50,237	43	523,872	+ 76,626
Brazilian Traction.....	July 25	95,720	97,133	4	388,200	+ 8,334
Brisbane	July	26,205	29,680	31	198,655	+ 21,447
British Columbia .....$	June	680,693	660,383	52	8,789,287	+ 297,048
Buenos Aires Pt. & City	May	6,925	6,713	22	36,517	+ 3,206
Buenos Aires Lacroze..	July	45,221	43,327	4	43,327	— 1,894
Calcutta.....Rs.	Aug. 8	65,534	69,317	31	21,52,703	+ 122,877
Cape Town	June	11,560	12,742	52	155,466	+ 13,240
Carthagena & Herrerias	July	3,794	2,416	30	16,212	— 4,913
Cordoba.....	June	13,416	13,683	13	41,977	+ 1,915
East India	July	1,892	1,966	48	21,030	+ 809
Kalgoorlie	June	2,854	2,692	26	15,522	— 1,704
La Plata	July	4,770	4,359	30	33,603	— 2,739
Lima	May	32,256	33,150	22	173,754	+ 6,825
Lisbon ..... Mlrs.	May	...	178,215	...	...	...
Madras (14 days) Rs.	July 31	27,480	29,911	29	407,769	+ 32,682
Manila	June	133,500	132,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	357,500	+ 7,000
Mexico .....$	June	588,780	592,463	26	3,530,545	+ 265,005
Montevideo	July	29,189	26,417	39	283,663	— 3,939
Para	July	23,686	20,169	35	170,592	— 34,012
Port Elizabeth	June	3,268	3,212	52	44,931	+ 1,901
Puebla ..... $	June	61,300	52,000	26	380,800	+ 25,900
Rangoon	June	4,807	4,997	26	32,334	+ 982
Shanghai .....$	July 22	23,192	25,400	29	695,740	+ 100,778
Singapore .....$	July 25	12,486	11,520	29	356,905	+ 5,622
Toronto .....$	June	815,206	861,938	26	5,025,926	+ 370,440
Winnipeg.....$	June	321,037	335,012	26	2,091,552	+ 119,178

DICK, KERR & CO.,
Limited,
ABCHURCH YARD, CANNON STREET,
LONDON, E.C.
ENGINEERS & CONTRACTORS.

Complete Equipment
TRAMWAYS & LIGHT RAILWAYS
at home and abroad.

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return.			Aggregate.		
		1913.	1914.	Incr. or Dec.	Wks.	1913-4.	Increase or Dec.
Aberdeen Corporation..	Aug. 5	£2,031	£2,052	+ £21	9	£18,080	+ £1,410
Accrington Corp.....	,, 5	535	534	— 61	18	11,024	+ 404
Ayr Corporation	,, 8	706	521	— 185	12	6,301	+ 91
Bath Electric	,, 5	1,289	1,503	+ 214	31	30,760	+ 2,376
Birkenhead Corp.	,, 9	1,570	1,333	— 37	18½	24,298	— 478
Birmingham Corp.	,, 8	11,392	11,792	+ 400	19	236,544	+ 19,784
Blackburn Corporation	,, 5	1,384	1,316	— 68	19	26,351	+ 1,118
Blackpool Corporation	,, 6	5,786	5,188	— 598	19	40,195	+ 3,612
Bolton Corporation	,, 9	2,781	2,741	— 40	19	53,906	+ 1,751
Bournemouth Corp.....	,, 12	3,174	2,551	— 623	19	43,647	+ 1,715
Bradford Corporation..	,, 8	6,365	6,251	— 114	19	121,447	+ 7,439
Brighton Corporation..	,, 9	2,569	2,195	— 371	18½	23,173	+ 1,115
Bristol	,, 7	11,819	12,088	+ 269	31½	271,286	+ 20,661
British Elec. Federatn	,, 7	67,389	69,373	*	...	...	...
Burnley Corporation ..	,, 8	2,107	1,570	— 537	19	32,244	— 514
Burton-on-Trent Corp.	,, 9	381	366	— 15	19	5,855	+ 328
Bury Corporation.....	,, 9	1,375	1,371	— 4	18½	26,545	+ 362
Cardiff Corporation....	July 18	2,838	3,103	+ 265	15	45,786	+ 2,932
Chatham and District..	Aug. 6	1,282	1,152	— 130	31	28,798	+ 474
Chesterfield Corp.	July 23	250	280	+ 30	16	4,628	+ 480
Colne Corporation	Aug. 8	335	251	— 84	...	...	...
Cork Electric.....	,, 6	573	571	— 2	31	15,702	+ 223
Croydon Corporation ..	July 31	1,657	1,701	+ 44	17	31,953	+ 2,383
Darlington Corporation	,, 25	266	298	+ 32	17	4,537	+ 312
Derby Corporation	Aug. 8	1,148	1,169	+ 21	18½	19,874	+ 1,068
Dover Corporation	,, 8	376	382	+ 6	19	4,963	+ 229
Dublin & Lucan	,, 7	241	230	— 11	5½	1,002	— 72
Dublin United	,, 7	7,540	6,859	— 681	31	184,454	— 4,079
Dundee City	,, 5	1,301	1,264	— 37	11½	16,117	+ 466
East Ham Corporation	,, 8	1,059	1,272	+ 213	18½	20,513	+ 1,630
Exeter Corporation	,, 7	489	476	— 13	19	7,067	+ 414
Gearless Motor 'Buses.	,, 8	632	376	— 256	32	14,877	+ 6,989
Glasgow Corporation ..	,, 8	19,302	19,512	+ 210	9	202,254	+ 9,691
Glossop (U. Elec. Supply)	,, 8	139	125	— 14	32	3,992	— 116
Halifax Corporation ..	,, 4	2,521	2,434	— 87	18	41,427	+ 1,883
Hastings & District.....	,, 5	1,896	1,806	— 90	30	30,152	+ 481
Huddersfield Corp.	,, 8	2,408	2,316	— 92	19	65,285	+ 4,911
Hull Corporation	,, 8	3,216	3,231	+ 15	19	60,248	+ 2,343
Ilford U.D.C.	,, 8	549	677	+ 128	18	10,434	+ 1,732
Ilkeston Corporation ..	,, 12	132	119	— 13	19	2,508	— 9
Ipswich Corporation ..	,, 8	687	630	— 57	19	9,495	+ 634
Isle of Thanet	,, 8	2,337	1,937	— 400	44	25,898	+ 667
Kilmarnock Corp.	,, 8	172	157	— 15	12	2,215	— 94
Lanarkshire	,, 6	1,650	1,744	+ 94	31	59,325	+ 7,655
Lancashire United	,, 5	1,931	1,859	— 72	31	51,590	+ 4,911
Leeds City	,, 8	9,161	8,665	— 496	19	163,020	+ 5,942
Leicester Corporation..	,, 8	3,042	2,991	— 51	32	92,778	+ 4,444
Leith Corporation	,, 8	752	754	+ 2	12	9,711	+ 539
Leyton U.D.C.	,, 6	1,744	1,733	— 11	17	26,453	+ 1,316
Liverpool Corporation..	,, 8	14,348	14,493	+ 145	31½	417,845	+ 12,868
Llandudno & Colwyn B.	,, 7	1,097	976	— 121	36	10,793	— 111
London County Council	,, 5	43,285	46,199	+ 2,914	18	805,982	+ 36,906
London Gnl. Omnibus..	,, 1	68,575	71,625	+ 3,050	31	1,982,031	+ 64,394
London United	,, 7	9,382	8,047	— 1,335	32	199,117	+ 559
Lowestoft Corporation	,, 8	541	537	— 4	44	9,351	+ 918
Maidstone Corporation	July 30	226	235	+ 9	18	3,937	+ 286
Manchester Corp.....	Aug. 8	17,969	17,101	— 868	19	337,955	+ 5,799
Met. Elec. Trys.	,, 7	11,028	10,415	— 613	32	292,289	+ 6,278
Nat. Steam Car Co., Ld.	,, 7	3,749	4,971	+ 1,222	39½	170,316	+ 66,772
Nelson Corporation.....	,, 8	233	176	— 57	18½	4,066	Nil
N'castle-on-Tyne Corp.	,, 8	4,994	5,390	+ 396	19	101,235	+ 9,830
Newport (Mon.) Corp...	,, 1	831	838	+ 7	18	15,326	+ 1,882
New St. Helens & Dist..	,, 5	1,391	1,381	— 10	5	5,139	— 219
Northampton Corp	,, 7	746	714	— 32	18½	11,356	+ 336
Nottingham Corp.	,, 6	3,663	3,815	+ 152	18½	65,676	+ 3,557
Oldham Corporation ..	,, 9	2,234	2,062	— 172	20	46,114	+ 2,075
Portsmouth Corp.....	,, 1	2,504	2,925	+ 421	17	42,895	...
Preston Corporation ..	,, 5	878	947	+ 69	19	17,276	+ 326
Provincial	,, 8	3,877	3,178	— 699	44	85,897	+ 3,815
Reading Corporation ..	,, 6	905	907	+ 2	18	18 718	+ 874
Rhondda.....	,, 6	1,651	1,644	— 7	31	38,998	+ 1,886
Rochdale Corporation	,, 8	1,787	1,524	— 263	19	31,118	+ 270
Rotherham Corp.....	,, 12	1,011	1,017	+ 6	19	19,796	+ 924
Salford Corporation ..	,, 10	4,959	4,775	— 184	18	99,606	— 403
Sheffield Corporation...	,, 9	7,470	7,406	— 64	19½	154,886	+ 7,394
Southampton Corp.....	,, 5	1,838	1,814	— 24	18	25,990	+ 1,385
Southend-on-Sea Corp	,, 5	1,983	2,135	+ 152	19	21,493	+ 3,570
South Met. Trys.	,, 7	1,213	1,272	+ 59	32	35,112	+ 8,633
South Shields Corp.....	,, 8	945	1,036	+ 91	18½	15,494	+ 1,796
Sunderland Corp.....	,, 10	2 047	2,110	+ 63	19	29,611	+ 1,488
Sunderland District ..	,, 5	799	779	— 20	40	23.742	+ 1,971
Swindon Corporation ..	,, 5	226	218	— 8	18	3.283	+ 286
Torquay.....	,, 6	1,429	1,231	— 198	31	18 176	+ 364
Trys. (M.E.T.) 'Buses	,, 8	8.915	8,846	— 69	32	286.674	+ 184,535
TynesideTrys. & Tmrds	,, 5	769	769	Nil	6	3,173	+ 66
Wallasey Corporation	,, 8	1,794	1,716	— 78	18½	25 745	+ 1,664
Walsall Corporation ..	,, 8	764	744	— 20	32	20.049	+ 409
Walthamstow U.D.C....	,, 8	1,030	990	— 40	19	16,166	+ 1,762
Warrington Corp	July 30	430	433	+ 3	17	6,741	— 85
West Ham Corporation	Aug. 6	3,020	3 098	+ 78	18	53,461	+ 2,479
Wigan Corporation	,, 6	1,644	1,612	— 32	18	27,889	+ 507
Wolverhampton Corp	,, 12	1,011	1 002	— 9	20	21,572	+ 345
Yorkshire (W. Riding)	,, 9	2,070	1,667	— 403	32	46,906	+ 815

* From such of the services as were working both last year and this year the receipts show a decrease of £4,589 upon the week.

ELECTRIC RAILWAY TRAFFIC RETURNS.

NAME.	Week ended	Latest Return.			Aggregate.		
		1913.	1914.	Incr. or Dec.	Wks.	1914.	Increase or Dec.
Central London.....	Aug. 1	£4,142	£4,260	+ £115	31	£153,116	— £2,378
City and South London	,, 1	2,599	2,480	— 119	31	82,703	— 5,243
Liverpool Overhead.....	,, 2	1,840	1,814	— 26	31	53,212	+ 497
London Electric.....	,, 1	11,660	12,120	+ 460	31	432,635	+ 1,900
Mersey	,, 1	2,106	2,115	+ 9	31	69,071	— 289
Metropolitan	,, 2	17.879	18,224	+ 345	31	568,081	+ 42,280
Metropolitan District..	,, 1	12.379	12,542	+ 163	31	406.451	+ 353

The Tramway & Railway World can be obtained, post free, at the following rates:—

For the United Kingdom—Twenty-five Shillings per annum (including 64 issues, of which 12 are large illustrated numbers). One Shilling per Single Copy.
For places abroad—Thirty Shillings per annum.

Tel. No.: 2948 Gerrard.
Telegraphic Address: "Tramigro," London.

AMBERLEY HOUSE,
NORFOLK ST., W.C.

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THE

Tramway & Railway World

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Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than 3 p.m. on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

CITY OF MELBOURNE, AUSTRALIA.

SUPPLY OF BARE HARD DRAWN COPPER CABLE.

Tenders are invited for the supply of—

Tons.	Cwts.		
1	10	7/18 S.W.G.	Cable.
1	0	7/16 ,,	,,
1	0	7/14 ,,	,,
1	0	19/16 ,,	,,
1	0	19/.083 ,,	,,
1	0	19/.101 ,,	,,

Copies of specification, conditions of tender and of contract and form of tender can be obtained on application to the undersigned.

Such application must be accompanied by a deposit of 5s., which will be returned on receipt of a *bona-fide* tender.

Tenders to be sent to the undersigned, endorsed "Tenders for Bare Hard Drawn Copper Cable," and must be received by them not later than 12 noon on Wednesday, September 2, 1914.

The Council reserves to itself the right, but does not bind itself to accept, the whole or any portion of any tender.

McIlwraith, McEacharn and Co. Ppty. (Ltd.),
Billiter Square Buildings, London, E.C.,
Agents for the Melbourne City Council.

VICTORIAN STATE RAILWAYS.

The Agent-General for Victoria, Australia, invites tenders for the supply and delivery at the Port of Melbourne fully inclusive of Australian Customs Duties, etc., of the following :—

Contract No. 25,823.—Low-Tension Switchgear and Instruments.

Contract No. 26,109.—Low-Tension Cables.

Contract No. 26,111.—Fuse Distribution Boxes and Fuses.

Specifications, conditions of contract, and forms of tender, may be obtained by *bona-fide* tenderers on application at the offices of the Consulting Engineers, John Coates and Co., Limited, 115, Victoria Street, London, S.W.

Tenders, accompanied by preliminary deposits named in conditions of tendering, must be delivered to the Agent-General for Victoria, Melbourne Place, Strand, London, W.C., not later than 11 a.m. on Wednesday, October 14, 1914, marked "Tender for Equipment of New Workshops—Contract 25,823, Contract 26,109, or Contract 26,111" respectively.

The Government of Victoria does not bind itself to accept the lowest or any tender.

Peter McBride,
Agent-General for Victoria.

CITY OF BRADFORD.

TENDERS FOR THE SUPPLY OF TRAMWAY TICKETS.

The Corporation of Bradford are prepared to receive tenders for the supply of Tramway Tickets for a period of not exceeding three years. The approximate consumption is 50,000,000 per annum. The standard specimens can be inspected, and a copy of the schedule obtained, on application to the Manager of the Stationery Department, Town Hall, Bradford, on payment of half a guinea, which will be returned upon receipt of a *bona-fide* tender.

The contract will be let subject to the Fair Contracts Clauses of the Corporation.

Tenders, endorsed "Tender for Tramway Tickets," must be sent to me not later than Wednesday, September 30, 1914.

The Corporation do not bind themselves to accept the lowest or any tender.

Frederick Stevens,
Town Clerk.

Town Hall, Bradford, August, 1914.

CITY AND ROYAL BURGH OF DUNDEE.

ELECTRICITY DEPARTMENT.

The Corporation invites tenders for the supply, delivery, and erection of the following :—

Section A, Rotary Converters.

Section B, Switchgear.

Specifications, drawings, form of tender, and general conditions of contract may be obtained from the undersigned on the payment of one guinea, which will be returned on receipt of a *bona-fide* tender.

Tenders, sealed in envelopes provided, to be lodged with W. H. Blyth Martin, Esq., Town Clerk, City Chambers, Dundee, not later than by first post on Monday, August 31, 1914.

The Town Council do not bind themselves to accept the lowest or any tender, and each section will be regarded as a separate contract.

H. Richardson, M.Inst.E.E.,
General Manager and Engineer.

Electricity Department, Dundee,
August 14, 1914.

COUNTY BOROUGH OF SOUTHAMPTON.

TO TAILORS AND OTHERS.

The Corporation invite tenders for the supply of about 225 Pairs of Blue Serge Trousers suitable for winter wear for the employees of the Tramways Department. Forms of tender, with conditions and particulars, may be obtained, and pattern inspected, at the Tramway Offices, Above Bar Street.

Sealed tenders on the printed form, endorsed "Tender for Tramway Uniforms," must be left at the Town Clerk's Office by the 31st August, 1914.

No pledge is given to accept the lowest or any tender.

R. R. Linthorne,
Town Clerk.

Town Clerk's Office,
Municipal Offices, Southampton,
July 30, 1914.

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MANCHESTER CORPORATION TRAMWAYS.

The Tramways Committee of the Manchester Corporation are prepared to receive tenders for the supply and erection of Steel Storage Shelving in their Stores Department, Hyde Road depôt, Manchester.

Specifications and forms of tender may be obtained on application to Mr. J. M. McElroy, General Manager, Corporation Tramways, 55, Piccadilly, Manchester. Tenders are to be addressed to the Chairman of the Tramways Committee, 55, Piccadilly, Manchester, endorsed "Tender for Shelving," and must be received not later than 10 a.m. on Tuesday, September 15, 1914.

The Committee do not bind themselves to accept the lowest or any tender.

THOMAS HUDSON,
Town Clerk.

Town Hall, Manchester,
August 21, 1914.

POSITIONS VACANT.

COUNTY BOROUGH OF OLDHAM.

JUNIOR ASSISTANT ELECTRICAL ENGINEER.

The Oldham Corporation Electricity Committee invite applications for the position of Junior Assistant Electrical Engineer, in charge of an eight-hour shift. Salary £80, advancing to £100 by annual increments of £10. Previous experience in low and extra-high-tension of central station essential.

Applications, endorsed "Junior Assistant Electrical Engineer," stating age, experience, etc., together with copies of not more than three recent testimonials, to be sent to Mr. Fred. L. Ogden, Joint Electrical Engineer and Manager, Greenhill Electricity Offices, Oldham, not later than Wednesday, September 2, 1914.

Canvassing will be a disqualification.

J. H. HALLSWORTH,
Town Clerk.

Oldham, August 19, 1914.

ERITH URBAN DISTRICT COUNCIL.

ELECTRICITY DEPARTMENT.

Charge Engineer.—Applications are invited from qualified persons for above position. Applicants must possess high-tension three-phase experience, and be conversant with details of a modern A.C. station. Salary 40s. to 50s. per week.

Applications, stating age, experience, and present and past positions, with copies of testimonials, to be addressed to the Engineer and Manager, Electricity Offices, Walnut Tree Road, Erith, S.E.

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Dey-Time Register for Sale, for 50 Hands. In good working order. Apply, National Rail and Tramway Appliances Company, Limited, Taylor Street, Liverpool.

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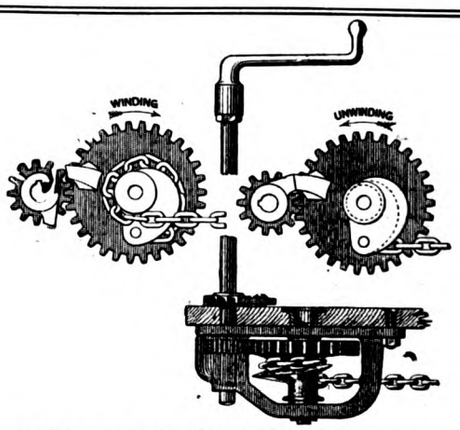

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THE
Tramway and Railway World

Established in 1892 and Published by

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SATURDAY, AUGUST 22, 1914.

THE "OCEAN"
ACCIDENT AND GUARANTEE CORPORATION, LTD.,
IS THE
PREMIER INSURER OF TRAMWAYS
HEAD OFFICE:
MOORGATE STREET, LONDON, E.C.

A GREAT OPPORTUNITY FOR BRITISH MANUFACTURERS.

Last week we dealt with some of the more general considerations affecting the tramway industry arising from the outbreak of the European war. It is now important to call attention to the unprecedented opportunity offering to British electrical manufacturers of acquiring a great volume of Germany's and of Austria's foreign trade, which these countries have lost at one stroke by the silent victory of British naval power. The Government are giving assistance to all branches of industry, so many of which have suffered from German competition, in the way of providing information and help towards further opening up colonial and foreign neutral markets to British goods. Electrical machinery is one of the branches in regard to which the Board of Trade are lending a hand. As Germany is sealed up, our manufacturers have a chance such as they have never had before, and the business connections made will in many cases be permanent. We would call particular attention to the circular letter of the Board of Trade and the monograph on German and Austrian electrical exports which are abstracted on another page of this issue. The figures need not be repeated here; it is sufficient to note that the value of the annual exports of electrical machinery from Germany in particular is enormous, and that with energy on the part of our manufacturers, backed up by the efforts of three Government Departments, a great proportion of this trade may for the future be secured for Great Britain. It behoves our manufacturers to spare no effort. No means of propaganda and, least of all, advertising should be neglected. The expenditure may not immediately be recouped, but it should be regarded as a special appropriation for widening the field of operation. While the acquisition of new markets always entails a certain amount of risk, the risk in this case is much smaller than usual. All that the enterprising business man wants to know is that there is a reasonable prospect of his expenditure for any purpose proving fruitful. In the present case there is every reason to believe that an enterprising policy will pay handsomely and continuously. American manufacturers have already noted the opportunity, and may be trusted to make good use of it. The British nation as a whole has sustained the shock of the outbreak of war magnificently, and it looks to the captains of industry to make every effort to carry on and to extend our trade, so that there may be some ultimate advantage gained as a result of the great national sacrifices which the present war must entail. The quotation: "There is a tide in the affairs of men," and so on, is peculiarly applicable to present circumstances. The great boom in trade generally which ought to follow the present war will be made all the greater, so far as our manufacturers are concerned, if they bestir themselves now. The quality of British electrical appliances is second to none in the world, and now they have got an unusual kind of "protection" of a temporary kind. The Board of Trade will help in every possible way by supplying information as to markets abroad. Therefore, let our manufacturers bestir themselves.

THE NEED TO KEEP WORK GOING.

The Council of the British Electrical and Allied Manufacturers' Association have sent the following letter to the principal railway companies, municipal corporations, and other large purchasers of electrical plant and apparatus in Great Britain. The importance of the point urged will be evident to all:—

The British Electrical and Allied Manufacturers' Association,
King's House, Kingsway, London, W.C.
August 14, 1914.

THE WAR AND TRADE.

SIR,—There are many evidences of a tendency on the part of purchasers (by no means the smallest) to take advantage of clauses in their contracts to suspend and delay work on account of the war, and the members of this association, who employ tens of thousands of working men, are already so affected in respect of contracts representing over a million pounds sterling.

Should such suspension and delay become at all the common practice, the result, for working men, would be disastrous.

One of the primary duties of every Britisher at the present moment is to maintain employment as far as ever possible, and my council desire to appeal for the prompt and sympathetic consideration of this question by all present or prospective purchasers of electrical goods and goods used in connection with electrical work.

Our own Government, by common consent, has set an excellent example, financially and otherwise, and has given every assurance towards allaying traders' fears.

The Colonial Governments have done the same, notably the Australian Government, who have publicly exhorted their own importers to keep up and extend trade with Britain, recognising at once the extremely important issue involved, both now and in the future.

On behalf of the Council of this Association, I commend this matter to your earnest consideration.

Yours faithfully,
F. R. DAVENPORT,
Chairman of Council.

THE WAR AND ELECTRICAL INDUSTRIES.

GREAT PROSPECTS FOR BRITISH FIRMS.

The Foreign Office, the Colonial Office, and the Board of Trade have during the week taken active steps to help British manufacturers in the efforts which they are now beginning to make to capture some of the German and Austrian trade in British Colonial and in neutral markets which has been cut off from Germany and Austria by the war and the supremacy of the British Navy. To grasp the position, it may first be noted that while Germany last year exported goods to this country of a value of £80,000,000, her total exports reached a sum of nearly £500,000,000. In 1913 this country imported £700,000 worth of German electrical machinery and appliances of all kinds. The Foreign Office and the Colonial Office are now bestirring themselves to collect from neutral foreign countries and from the Colonies particulars of German and Austrian goods dealt in there, and to get samples sent home for the benefit of British manufacturers.

Perhaps it is the action of the Board of Trade which will most

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concern British manufacturers of electrical plant. The Commercial Intelligence Branch of the Board on Wednesday sent out a circular letter along with the first instalment of a series of monographs on special groups of trades. In this letter it was stated :—

"The Board of Trade are undertaking a campaign to assist and supplement the efforts of British manufacturers and traders to take advantage of the present opportunity to establish themselves in foreign and colonial markets in branches of trade which have hitherto been largely in the hands of their German, Austrian or Hungarian rivals. . . . It need hardly be pointed out how important the matter is from the point of view of preserving continuity of employment for our industrial population, to say nothing of the possible ultimate gain to British overseas trade. The Director of the Commercial Intelligence Branch, whose offices are at 73, Basinghall Street, E.C., will be ready to receive and answer personal and written inquiries for further information with regard to particular trades and markets. The Board of Trade are also obtaining information as to the commercial and financial situation in the Dominions and foreign markets, and particulars on this subject will be circulated in the course of a few days."

The monograph on electrical appliances and apparatus is a pamphlet of no less than 48 pages, most of which are taken up with voluminous notes on the character of the trade in the Dominions and foreign countries. The appended statements give the essence of the matter as regards exports from Germany and Austria.

Statement for a recent year of the value of certain descriptions of electrical appliances and apparatus exported from Germany and Austria-Hungary to all destinations :—

	Exported from Germany (1912).	Exported from Austria-Hungary (1913).
	£	£
Dynamos, electro-motors, converters, transformers, &c.	2,521,000	62,000
Ready worked armatures, commutators, &c.	382,000	—
Storage batteries, spare plates for same (electrodes) Without celluloid, vulcanite, &c.	319,000	320
With celluloid, vulcanite, &c.	38,000	
Electric arc lamps, mercury vapour lamps, &c.	133,000	
Complete frames for arc lamps, mercury vapour lamps, &c., with glass globes (also covered with network)	28,000	16,900
Search-lights—light diffusing reflectors	54,000	—
Metallic filament and metal wire lamps	2,307,000	223,000
Carbon filament, Nernst, &c., electrical incandescent lamps	170,000	
Electrical appliances for illumination, transmission of power, &c.; series resistances and shunt resistances, &c., and parts thereof	2,082,000	85,500
Total of the foregoing	8,034,000	387,720

The following statement shows, for a recent year, the value of dynamos, electro-motors and other electrical machinery exported from Germany, Austria-Hungary, and the United Kingdom, to all destinations :—

Exports of dynamos, electro-motors, and other electrical machinery :—

From Germany (1912) £2,521,000
From Austria-Hungary (1913) £62,000
From United Kingdom (1913) £2,269,000

The principal markets for German dynamos, etc., are Argentina, Russia, Italy, Japan, Spain, Netherlands, Brazil, and the United Kingdam—the bulk of the trade being in the heavier kinds of machinery. The aggregate value of German exports of electrical machinery to 16 of her principal markets in 1912 was £1,892,000. The principal markets for Austrian-made dynamos, etc., are Italy, Roumania, Bulgaria, Turkey, and Greece. The value of the exports to her principal markets in 1913 was £35,750. The value of the exports in 1913 of electrical machinery of all kinds from the United Kingdom to the principal markets where there is competition with German and Austrian manufactures was £1,366,100, compared with a combined German and Austrian total of £2,583,000, so that there is ample scope for the development of British trade in this class of goods. Statistics are also given of the values of exports of electric glow lamps, the aggregate figures being :—Germany, £2,477,000; Austria, £223,000; United Kingdom, £152,000. The exports of sundry other electrical appliances are also tabulated.

TRAMWAYS AND THE WAR.

In addition to the matters dealt with in our issue of last Saturday in regard to tramway employees and the war some further items of interest fall to be recorded.

A fund for the relief of dependents of tramway and electric supply men who are called on service has been established by about forty tramway and electrical companies in the British Electrical Federation. It provides for the companies subscribing an amount equal to the total contributions made by the employees who remain at work. The contributions of the companies will not be less than 3d. per week in respect of every man in their employment. The men who have been called out have been given to understand that their places will be kept open for them upon their return. In the event of a reduction of services becoming necessary the companies will endeavour, by equalising the work as much as possible, to avoid reduction of staff.

In Liverpool the question of the conveyance of goods by the tramways has been revived. The commandeering of large numbers of horses and commercial motor vehicles as a result of the war has led to a considerable congestion at the docks. The matter was mentioned at a meeting of the Tramways and Electric Power and Lighting Committee, when it was decided to send a deputation to confer with the Chamber of Commerce with a view to seeing whether it is possible to devise a scheme for relieving the congestion through the medium of tramway traction.

Arrangements have been made for the extension to special constables of the free travelling facilities already accorded on the London County Council's tramways to soldiers, sailors, members of the St. John's Ambulance Association, Red Cross Society nurses in uniform or wearing distinctive dress, and Boy Scouts engaged as despatch carriers for the War Office.

At the fortnightly meeting of the Oldham Tramways Committee it was reported that 72 men had been called out by the mobilisation order, and it was possible that another 20 might be called on. Time-expired men were volunteering. Alderman Isherwood, the chairman, said that the calling out of Reserves and Territorials had hit the tramway department worse than any other department of the Corporation. Arrangements have been made to pay half wages to men who were married or had dependents. It was also mentioned that the traffic receipts were down considerably. The committee are trying to keep as many men as possible on the permanent way work, so as to avoid unemployment.

Hundreds of Glasgow tramway employees have offered their services as special constables. These men are apart from those who have been called up as Reservists and Territorials.

The following are the arrangements made by the Edinburgh and District Tramways Company in regard to wages of employees who are Reservists or Territorials :—A married man will receive from the company his ordinary wages less the amount received from the Government; an unmarried man who has a relative or a dependent will keep his Government pay and in addition the relative or dependent will receive 1s. 1d. per day and a further 10s. per week; an unmarried man with no dependent will receive his Government pay and 10s. per week.

MISCELLANEOUS NEWS AND NOTES.

J. Hopkinson and Co., Ltd., have removed their London offices from Queen Victoria Street, E.C., to Imperial House, Kingsway, W.C.

Electric Traction in Italy.—The Minister of Public Works has approved the scheme for an electric metropolitan railway from Sampierdarina to Quarto (about 6½ miles) at a cost of about £1,200,000.

The Edison and Swan United Electric Light Co., of Melbourne, have been appointed agents in Victoria and Tasmania for the a.c. and d.c. meters, etc., of Messrs. Chamberlain and Hookham, Birmingham.

Municipal Tramway Conference.—We are officially informed that at a meeting of the Executive Council of the Municipal Tramways Association held in Manchester on August 14, it was decided that in view of the present state of affairs due to the European crisis it was inadvisable to hold the annual conference of the Association which was to have taken place at Salford in the end of September. All the arrangements have accordingly been cancelled. The annual meeting, as distinct from the conference, will be called later.

A New Traction Lamp.—A new form of traction lamp with a drawn-wire tungsten filament has been put on the market by Siemens Bros. Dynamo Works, Ltd., Tyssen Street, Dalston. These lamps are manufactured in England, and have spiralised filaments carried on spiders in the usual manner. Instead, however, of the filament being wound up and down, as has been the case previously, the spider is arranged so that equal lengths of filament are carried vertically and horizontally. Increased candle power and a longer life are claimed for the new lamp.

Women Tramway Conductors.—A Dutch official, who has returned from Berlin, gives an interesting glimpse of Germany under war conditions. Wages, he declares, have fallen 30 per cent. everywhere. In Berlin only women tram-conductors are now seen, and old men are doing service as drivers. The slaughter of cattle has been restricted, the object being to obtain Dutch cattle and to reserve the German supply. At all the large stations groups of ladies were waiting to supply, gratis, the passing troop trains with coffee, tea and light refreshments.

Concessions at Reading.—The Tramways Committee have made a number of concessions to the employees of the department, including the following :—Spread-over time and hours of rest now to be dealt with by the manager and engineer. Spare men are to receive 1s. for each day they register and do not obtain employment. The workmen employed in cleaning and working under the cars will be provided with overalls and clogs. First-aid appliances are to be provided at the depôt, and a sufficient number of employees are to be instructed in rendering first aid.

Cheap Current at Burton.—Alderman Lowe, chairman of the Electricity Committee of the Burton Corporation, made a statement at the last meeting of the Council with regard to the sale of electricity for power which clearly proved the wisdom of the practice of selling current at a price that would favourably compete with other sources of power—viz., gas, petrol, steam, etc. Referring to the period prior to the introduction of the tramways, Mr. Lowe said they continued to lose money year after year. The first substantial help to the undertaking was the tramways, but owing to the low charge, more current was now sold for ordinary power purposes than for traction, and this at a price which was less than cost. Although more cheap current was sold last year than in any other year the department made a profit of £3,000 which was higher than for any previous period.

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The Dey Time Registers, Limited, of Queen Victoria Street, E.C., have amalgamated with the International Time Recording Company, Limited, of City Road, E.C., and both firms will give up their present premises. The combined businesses will be known as the International Time Recording Company, Limited, and will occupy the entire five-storey building at 30-32, Farringdon Road, E.C. This brings together the two oldest and largest firms in the business, and their complete range of all kinds of time recorders for time-keeping and job costing should prove beneficial to the many users of both machines.

Workmen's Fares in Leeds.—Leeds Tramways Committee on Monday made a rather unusual departure in connection with workmen's fares. They decided to extend the time during which such fares are charged from 7.45 a.m. to 8.45 a.m. in order that workmen should get the advantage of the reduced fare up till 8.45. Employers have to forward to the tramway department the names, addresses and occupations of any employees who require to travel to work during the extended hour, and on a personal visit each workman will receive a card on the presentation of which the conductor will issue to him a workman's fare ticket. A similar arrangement is being made in Huddersfield.

The Safety Movement in Glasgow.—The determination of Mr. James Dalrymple, general manager of Glasgow tramways, to do everything possible for the safety of the public in connection with the working of the tramways was evidenced in a fresh direction when it was reported at a recent meeting of the Glasgow United Free Church Presbytery that a letter had been received from Mr. Dalrymple suggesting that the Presbytery might set aside one Sunday in each year to be called "Safety Sunday," when ministers might give the question of safety special prominence in the service. The Presbytery resolved to send a reply stating that while they could not see their way to set aside one Sunday each year, they would do what they could in the matter.

The International Tramway Congress.—As announced in our issue of August 8 the Executive Council at Brussels on the outbreak of war promptly cancelled all arrangements for the congress which was to have been held at Budapest early next month. As an indication of the calmness with which our Belgian friends attended to business even in the first shock of the German invasion we may mention that we were officially informed by telegraph of this decision on August 6. The decision was taken with businesslike promptitude, and we were at once apprised of the action that had been taken. There seems to be some misapprehension in regard to the frequency of these International Tramway Congresses. They have never been held bi-annually, but always biennially. The terms are sometimes carelessly used as interchangeable, but they are, of course, not synonymous. It is not probable, however, that the next congress will be held before 1916.

An Awkward Dilemma.—In Dundee, as in various other towns in the country, children are carried free on tramcars, and this gives rise to some trouble to conductors, owing to the inconsiderate conduct on the part of some parents or guardians. The matter was brought before a meeting of the Tramways Committee by Mr. Peter Fisher, the manager. He cited a case in which a woman entered a car with two children, and as the latter were under five years of age they were not charged for. The children were placed on the seat by the mother, and although the car became full and passengers who had paid fares had to stand up, the mother refused when asked by the conductor to remove the children from the seat, so as to allow the paying passengers to sit down. Several members of the committee stated that the conductor had the authority of the committee to enforce such a request. Mr. Fisher stated that he had seen several cases of the sort. It was agreed to give the conductors authority to see that passengers who had paid fares were not deprived of seats in such a manner, and some members of the committee expressed the opinion that the remedy against a refusal was to put the parent and children out of the car.

The Ediswan Company inform us that the staff of employees in the Royal Ediswan lamp manufacturing section is being added to daily and full time worked; this is owing to increased orders for all makes of Royal Ediswan lamps. The effect of advertising through the trade papers and the fact that Royal Ediswan drawn wire and carbon lamps are made in Great Britain by British labour with British capital have had a very successful and patriotic effect. It is as yet a case of "counting chickens before they are hatched," or in other words "lamps before they are made," but the all British effect including British capital is likely to tell with the Ediswan Company in the near future in a very marked degree. In the future the public will be, and in fact have to be, far more patriotic in their buying, and we think that English made and English backed goods will govern the market. The company have every confidence in the present general situation, and in their ability to meet all demands now and in future, and no effort will be spared to maintain their usual service to the trade. The Ediswan engineering section is able to speak with equal confidence, not only because of the increased activity caused by Admiralty work, but also by the continuation so far of everyday orders, and in fact increased orders for many special lines. It is worthy to note that the firm are paying the wives of the married men serving in the Army half-pay, and will allow them to take over their old positions upon return.

The Development of Tramway Operation.—An illustration of the way in which things have advanced since the early days of electric tramways in this country was given by some of the proceedings at the last meeting of Southport Town Council. A minute was submitted asking for authority to make application to the Board of Trade to alter the speeds on certain routes, in one case the proposal being to increase the speed from 8 miles an hour to 15. One councillor objected to this proposal, as he thought it would be dangerous. Attention was called by another councillor to a recommendation that application should be made to the Board of Trade to abolish certain compulsory stopping places. The objection taken was that the stopping places were at a dangerous corner, and that it was necessary that all cars should stop there. Mr. Richardson, in reply to the discussion, said the electric cars were started in Southport in the very early days, and it was, in fact, one of the first systems in the country. The Board of Trade were very particular in those days with regard to the stops and the speed, and since then things were changed. Even in a busy city like Liverpool the speed limit was eighteen miles an hour, while they in the comparatively quiet town of Southport were only asking for a limit of 15 miles. They had carefully considered the Board of Trade stops, and those which they intended to apply for the abolition of were where they considered there was no danger. The recommendations were adopted.

CONTRACTS AND ORDERS.

The Railway Department, Sydney, Australia, have accepted the following tenders:—Specification 434, one 1,000kw. sub-station unit, Australian G. E. Co.; two 1,000kw. sub-station unit, British Westinghouse Co.

Sunderland Town Council has accepted the following tenders:—Cables, British Insulated and Helsby Cables Co., and India-Rubber Gutta-Percha and Telegraph Works Co.; E.H.T. switch and meter cabinet, British Thomson-Houston Co.

Aberdeen Tramways Committee proposed to order six additional cars of the pay-as-you-enter type at a cost of £4,284. The contracts proposed were:—Bodies, Brush Electrical Engineering Co., £2,742; motors, Brush Co., £1,080; electrical equipment, British Westinghouse Co., £462. At a meeting of the Corporation on Monday the proposal was referred back to the committee for further consideration.

PERSONAL.

Mr. C. A. L. Prussman, who has held the position of borough electrical engineer to the Swansea Corporation for the past 10 years, has now resigned. The Council have decided to advertise the post, and are offering a salary of £500 per annum.

Mr. Chas. Furness, electrical engineer and tramways manager to the Blackpool Corporation, has safely returned from his trip to Eysden in Holland, near the Belgian border, where he had gone for the purpose of bringing home his daughter who was at school there.

Mr. D. N. Dunlop, secretary of the B.E.A.M.A., who was in Zurich when the war broke out, has now returned to London. He left Zurich on Wednesday last week, and only arrived in Paris at noon on Saturday. The journey from Zurich to Paris occupied three days under extremely uncomfortable conditions.

Obituary.—The death took place last week of Mr. Edgar Armitage at the age of 48 years. The deceased had been employed by the Yorkshire Electric Tramways Company, Limited, ever since that company commenced operations. He went with the Dewsbury Detachment of the 4th King's Own Yorkshire Light Infantry to Doncaster, in response to the mobilisation orders, but on parade on the day following his arrival at Doncaster, Mr. Armitage did not feel well. He was taken to hospital, and died later in the day. —The death is recorded, at the age of 51 years, of Mr. Charles Cordingley, proprietor and editor of publications connected with the motor trades, and organiser of motor car and other exhibitions at the Agricultural Hall.

FINANCIAL REPORTS AND MEETINGS.

East Ham Tramways.—The accounts for the year ended March 31 last show that the total revenue was £54,015, as compared with £57,660 in the previous year, while the working expenses were £48,120 against £45,404. The percentage of working costs to revenue was thus 87.6 compared to 78.8. The gross surplus was £6,786 against £12,256. After providing for interest and sinking fund there is a deficit of £5,665 compared with a deficit of £275 in the previous year. The total working expenses were equal to 7.65d. per car mile, compared with 7.02d. in the previous year. The number of car miles was 1,510,251, compared with 1,375,433, while the number of passengers was 16,671,505, against 17,775,698. The total revenue per car mile was 8.73d., against 10.06d. The energy consumption per car mile was 1.58 units, against 1.55 units. No less than 64.22 per cent of the passengers were carried at ½d. fares, and these yielded 40.92 per cent. of the receipts.

Manaos Tramways and Light Company.—The report for the last financial year shows that the receipts of the tramway department amount to £87,028, as against £106,148 for the previous year, and from the lighting department £44,305, as against £44,148 for the previous year. The directors do not consider the above results to be unsatisfactory in view of the depression prevailing in Brazil generally, and particularly in the Amazon. Capital expenditure during the year amounted to £5,052. A large proportion of this sum represents the cost of completing the additional track work called for by the concession as mentioned in the last report. The State is heavily in arrears in payment for the street lighting. The Federal and the Municipal Governments' current accounts are also seriously in arrear, but other collections have been well maintained. Under these circumstances the directors cannot see their way to recommend the payment of a dividend. To the balance of £14,426 remaining after payment of debenture interest and sinking fund should be added the amount of £3,435 brought forward from last account, making a total of £17,861, which the directors recommend should be dealt with as follows: Transfer

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to contingencies reserve, making a total to the credit of this account of £23,725, £8,000; transfer to renewals reserve, making a total to the credit of this account of £27,000, £6,000; leaving a balance to be carried forward to next year's account of £3,861.

Montreal Tramways Company.—The report of the Montreal Tramways Company for the fiscal year ended June 30 last shows that the gross earnings were $7,142,804 and the working expenses $4,206,115, leaving net earnings of $2,936,689. After deducting city percentage of earnings, interest and taxes, there remains a net income of $736,837. After paying dividends and transferring $275,000 to contingent renewal account a sum of $137,544 is transferred to general surplus. The gross earnings show an increase of 5.75 per cent., the working expenses an increase of 4.3 per cent., and the net earnings an increase of 7.9 per cent. The ratio of expenses to earnings is 58.89 per cent., compared with 59.71 per cent. During the year there has been expended on capital account for additional rolling stock, extensions and improvements $2,711,572. Large additions have been made to the rolling stock during the past year. A new type of motor car and trailer has been introduced which has very materially helped the service on the main line, and the company is now considering the advisability of building more cars of this type. The increased rolling stock and extensions have necessitated further additions to the power requirements. The company has also completed a large portion of the rebuilding of the track.

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 59 of the principal undertakings of the United Kingdom for the week ended August 15 give total receipts of £237,911, or £4,972 more than in the corresponding week last year. The total length of track was 2,832 miles, or 24 more than for the corresponding week. Receipts were at the rate of £84 os. 2d. per track mile, an increase of £1 1s. 1d. as compared with the corresponding week of last year.

THE BRITISH ELECTRICAL FEDERATION.

The traffic statement for the week ended August 14, 1914, shows that the receipts from tramways and railways amounted to £40,981 as compared with £42,557 in the corresponding week last year, and from omnibuses £16,275, as compared with £11,584, making a total of £57,256, as compared with £54,141. The tramway and railway route mileage was 430.54, as compared with 428.47. Upon such of the services as were working both last year and this year the receipts show a decrease of £1,400 upon the week.

NOTICE.

COAL AND METAL PRICES—TRAFFIC RETURNS.

Owing to the war and the consequent dislocation of the markets no quotations of prices of copper and aluminium or of coal are available. The last quoted copper and aluminium prices will be found in our issue of July 25, and coal prices in our issue of August 1. As the railways have been put under Government control, the weekly traffic returns are not issued. Our table of electric railway traffic returns is accordingly omitted meantime.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return.		Aggregate		
		1912-3.	1913-4.	Wks.	1913-4.	Increase or Dec.
Anglo-Argentine	Aug. 12	£54,126	£52,585	32	£1,775,815	— £4,372
Auckland..... (28 days)	July 31	18,960	20,782	4½	23,311	+ 1,244
Ballarat and Bendigo	June 21	3,178	3,158	12	11,240	+ 95
Brazilian St. Rly. Mlrs	May	44,820	50,237	43	523,872	+ 76,626
Brazilian Traction.....	July 25	95,720	97,133	4	388,200	+ 8,334
Brisbane	July	26,205	29,680	31	198,655	+ 21,447
British Columbia .....$	June	680,693	660,383	52	8,789,287	+ 297,048
Buenos Aires Pt. & City	May	6,925	6,713	22	36,517	+ 3,206
Buenos Aires Lacroze..	July	45,221	43,327	4	43,327	-- 1,894
Calcutta.....Rs.	Aug. 15	66,096	68,138	32	22,20,841	+ 124,919
Cape Town	June	11,560	12,742	52	155,466	+ 13,249
Carthagena & Herreria	July	3,794	2,416	30	16,212	— 4,913
Cordoba	June	13,416	13,883	13	41,977	+ 1,915
East India	July	1,892	1,966	48	21,030	+ 809
Kalgoorlie	June	2,854	2,692	26	15,522	— 1,704
La Plata	July	4,770	4,359	30	33,603	— 2,739
Lima	June	31,210	33,310	26	207,160	+ 9,021
Lisbon ..... Mlrs.	June	176,170	169,311	26	971,885	+ 39,374
Madras (14 days) Rs.	Aug. 15	27,034	28,340	31	436,109	+ 33,988
Manila	June	133,500	132,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	387,500	+ 7,000
Mexico .....$	June	588,780	592,463	26	3,530,545	+ 265,005
Montevideo	July	29,189	26,417	39	283,663	— 3,939
Para	July	23,686	20,169	35	170,592	— 34,012
Port Elizabeth	June	3,268	3,212	52	44,931	+ 1,901
Puebla .. .. $	June	61,300	52,000	26	380,800	+ 25,900
Rangoon	June	4,807	4,997	26	32,334	+ 982
Shanghai .....$	July 22	23,192	25,400	29	695,740	+ 100,778
Singapore .....$	July 25	12,486	11,520	29	356,905	+ 5,622
Toronto .....$	June	815,206	861,938	26	5,025,926	+ 370,440
Winnipeg.....$	June	321,037	335,012	26	2,091,552	+ 119,178

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Telegraphic Address: "Tramigro," London.

AMBERLEY HOUSE, NORFOLK ST., W.C.

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return.			Aggregate.		
		1913.	1914.	Incr. or Dec.	Wks.	1913-4.	Increase or Dec.
Aberdeen Corporation..	Aug. 12	£1,908	£2,041	+ £133	11	£20,121	+ £1,543
Accrington Corp.....	,, 5	595	534	— 61	18	11,024	+ 404
Ayr Corporation	,, 15	541	507	— 34	13	6,810	+ 56
Bath Electric	,, 12	1,615	1,026	— 589	32	31,786	+ 1,787
Birkenhead Corp.	,, 16	1,290	1,322	+ 32	19½	25,620	— 446
Birmingham Corp.	,, 15	10,652	10,808	+ 156	20	247,352	+ 19,940
Blackburn Corporation	,, 12	1,332	1,694	+ 362	20	28,046	+ 1,423
Blackpool Corporation	,, 13	5,062	2.670	— 2,392	20	42,865	+ 1,257
Bolton Corporation	,, 16	2,716	3,112	+ 396	20	57,019	+ 2,148
Bournemouth Corp.....	,, 19	3,280	2 241	— 1,039	20	45,890	+ 678
Bradford Corporation..	,, 15	5,989	6,483	+ 494	20	127,930	+ 7,933
Brighton Corporation..	,, 16	1,591	1,276	— 315	19½	24,448	+ 799
Bristol	,, 14	8,622	8,893	+ 211	32½	280,729	+ 20,572
British Elec. Federatn	,, 14	54,141	57,256	*	...	...	...
Burnley Corporation ..	,, 15	1,741	1,608	— 133	20	33,852	— 647
Burton-on-Trent Corp.	,, 16	335	323	— 12	20	6,178	+ 315
Bury Corporation.....	,, 16	1,347	1,923	+ 576	19½	28,467	+ 937
Cardiff Corporation.....	July 18	2,838	3,103	+ 265	15	45,786	+ 2,982
Chatham and District..	Aug. 13	1,025	955	— 70	32	29,893	+ 545
Chesterfield Corp.	July 23	250	280	+ 30	16	4,638	+ 480
Colne Corporation	Aug. 18	278	296	— 18	...	...	...
Cork Electric.....	,, 13	548	514	— 34	32	16,216	+ 189
Croydon Corporation ..	,, 7	1,928	2,021	+ 93	18	33,974	+ 2,290
Darlington Corporatio	,, 15	258	261	+ 3	20	5,345	+ 337
Derby Corporation	,, 15	1,281	1,156	+ 125	19½	21,031	+ 1,194
Dover Corporation	,, 15	206	278	— 72	20	5,241	+ 156
Dublin & Lucan	,, 14	185	157	— 28	6½	1,160	— 98
Dublin United	,, 14	6,482	6,207	— 275	32	190,661	— 4,157
Dundee City	,, 12	1,265	1,244	— 21	12½	17,361	+ 444
East Ham Corporation	,, 15	927	1,272	+ 345	19½	21,785	+ 1,975
Exeter Corporation	,, 14	399	371	— 28	20	7,438	+ 386
Gearless Motor 'Buses.	,, 15	576	404	— 172	33	15.281	+ 6,817
Glasgow Corporation ..	,, 15	19,754	20,313	+ 559	10	222,567	+ 10,538
Glossop (U. Elec. Supply)	,, 15	140	145	+ 5	33	4,138	— 111
Halifax Corporation ..	,, 11	2,461	2,824	+ 363	19	44,251	+ 2,246
Hastings & District.....	,, 12	1 809	1,327	— 482	31	31,479	— 1
Huddersfield Corp.	,, 15	2,198	2,600	+ 402	20	67,885	+ 5,313
Hull Corporation	,, 15	2,994	2,927	— 67	20	63,175	+ 2,276
Ilford U.D.C.	,, 15	430	615	+ 185	19	11,049	+ 1,910
Ilkeston Corporation ..	,, 19	139	133	— 6	20	2,742	— 14
Ipswich Corporation ..	,, 15	570	488	— 82	20	9,987	+ 565
Isle of Thanet	,, 15	2,112	1,111	— 1,001	45	27,009	— 334
Kilmarnock Corp.	,, 15	161	164	+ 3	13	2,379	— 91
Lanarkshire	,, 13	1,698	1,821	+ 123	32	61,146	+ 7,778
Lancashire United	,, 12	1,628	1,579	— 49	32	53.173	+ 4,855
Leeds City	,, 15	7,899	7,717	— 182	20	170,737	+ 5,760
Leicester Corporation..	,, 15	2,670	2,674	+ 4	33	95,453	+ 4,580
Leith Corporation	,, 15	725	756	+ 31	13	10,467	+ 570
Leyton U.D.C.	,, 13	1,280	1,476	+ 196	18	27,929	+ 1,512
Liverpool Corporation..	,, 15	13,463	13,645	+ 182	32½	431,489	+ 13,050
Llandudno & Colwyn B.	,, 14	987	471	— 516	37	11.264	— 627
London County Council	,, 12	38.847	43,314	+ 4,467	19	849,296	+ 41,373
London Gnl. Omnibus..	,, 1	68,575	71,625	+ 3,050	31	1,982,031	+ 64,894
London United	,, 14	6,876	6.320	— 556	33	205,437	Nil
Lowestoft Corporation	,, 15	505	347	— 158	45	9,698	+ 759
Maidstone Corporation	July 30	226	235	+ 9	18	3,937	+ 286
Manchester Corp.....	Aug. 15	16,985	17,139	+ 154	20	355,094	+ 6,240
Met. Elec. Trys.	,, 14	8,732	8,625	— 107	33	300,914	+ 6,170
Nat. Steam Car Co., Ltd.	,, 14	3,349	4,723	+ 1,374	40½	175,039	+ 68,146
Nelson Corporation.....	,, 15	227	204	— 23	19½	4,270	— 23
N'castle-on-Tyne Corp.	,, 15	4,583	4,886	+ 303	20	106,121	+ 10,132
Newport (Mon.) Corp...	,, 15	783	798	+ 15	20	17,151	+ 1,983
New St. Helens & Dist..	,, 12	904	894	— 10	6	6,033	— 248
Northampton Corp	,, 14	577	530	— 47	19½	11.886	+ 290
Nottingham Corp.	,, 13	3,208	3,154	— 54	19½	68,831	+ 3,503
Oldham Corporation ..	,, 16	2,243	2.387	+ 144	21	48.501	+ 2,219
Portsmouth Corp.....	,, 1	2,504	2,925	+ 421	17	42 895	...
Preston Corporation ..	,, 12	951	1,191	+ 240	20	18,467	+ 565
Provincial	,, 15	2,894	2,287	— 607	45	88,185	+ 3,223
Reading Corporation ..	,, 13	718	739	+ 21	19	14 457	+ 894
Rhondda.....	,, 6	1,651	1,644	— 7	31	38,998	+ 1,886
Rochdale Corporation	,, 15	1.729	2.027	+ 298	20	33,146	+ 639
Rotherham Corp.....	,, 19	1,024	1,053	+ 29	20	20,850	+ 954
Salford Corporation ..	,, 17	5,142	5,184	+ 42	19	104.789	— 307
Sheffield Corporation..	,, 16	7,088	7,343	+ 254	20½	162,228	+ 7,613
Southampton Corp.....	,, 12	1,469	1,525	+ 56	19	27,515	+ 1,442
Southend-on-Sea Corp	,, 12	1,697	1,446	— 251	20	22,940	+ 3,319
South Met. Trys.	,, 11	1,351	1,221	— 130	33	36,332	+ 8,189
South Shields Corp.....	,, 15	841	819	— 22	19½	16,313	+ 1,793
Sunderland Corp.....	,, 16	1.552	1.720	+ 168	20	31,331	+ 1,656
Sunderland District ..	,, 12	598	577	— 21	41	24.319	+ 1,949
Swindon Corporation ..	,, 12	210	218	+ 8	19	3 501	+ 289
Torquay	,, 6	1,429	1,231	— 198	31	18 176	+ 364
Trys. (M.E.T.) 'Buses	,, 15	7.893	8,996	+ 1,103	33	291,670	+ 185,638
TynesideTrys. & Tmrds	,, 12	557	589	+ 32	7	3,762	+ 98
Wallasey Corporation ..	,, 15	1,482	1.477	— 5	19½	27 222	+ 1,659
Walsall Corporation ..	,, 15	597	605	+ 8	33	20.654	+ 418
Walthamstow U.D.C...	,, 15	765	861	+ 96	20	17,026	+ 1,875
Warrington Corp	July 30	430	433	+ 3	17	6,741	— 85
West Ham Corporation	Aug. 13	2,560	2.783	+ 223	19	56,244	+ 2,702
Wigan Corporation	,, 13	1,509	1,392	— 117	19	29,285	+ 389
Wolverhampton Corp	,, 19	1,129	974	— 155	21	22,547	+ 190
Yorkshire (W. Riding)	,, 16	1,392	1.580	+ 188	33	48,486	+ 1,003

* From such of the services as were working both last year and this year the receipts show a decrease of £1,400 upon the week.

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THE

Tramway & Railway World

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NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

DUBLIN AND SOUTH-EASTERN RAILWAY COMPANY.

The Directors of this Company are prepared to receive tenders for the Reconstruction of the Bridge carrying the railway over Adelaide Road, which adjoins Harcourt Street Terminus, Dublin.

The drawings and specification may be inspected on and after the 1st of September, 1914, at the Engineer's Office, Westland Row Station, Dublin, and forms of tender and schedules of quantities can be obtained on payment of one guinea, which will be refunded on receipt of a *bona-fide* tender.

Tenders, made out on the forms supplied by the Company, should be delivered under sealed cover, endorsed "Tender for Bridge," to the Secretary, Dublin and South-Eastern Railway, Westland Row Station, Dublin, before 10 a.m. on or before September 30, 1914.

The Directors do not bind themselves to accept the lowest or any tender.

A. G. REID,
Secretary.

Westland Row Station, Dublin,
August 22, 1914.

LEEDS CITY COUNCIL.

The Tramways and Electricity Committee invite tenders for the Construction of Tramway Track (Labour only) at

(1) Nippet Lane and Stoney Rock Lane.
(2) Selby Road.
(3) Guiseley.
(4) Harehills Lane.

Specification and forms of tender may be obtained upon application at the Tramways Office.

Tenders, duly endorsed "Tramways Construction of Track" and sealed, must be delivered not later than 10 a.m. on Monday, September 7, to the undersigned at the Tramways Office.

By order, J. B. HAMILTON,
General Manager.

SHIPLEY URBAN DISTRICT COUNCIL.

The Shipley Urban District Council invite tenders for the various works required in the Construction of an Elongated Grit Tank in water-bearing strata, Retaining Walls, Crane Road, Tramway, etc., at their Sewage Works.

Plans may be seen and copies of the specification, bill of quantities, and form of tender obtained at the Offices of the Engineers, Mr. M. Paterson, M.Inst.C.E., and Mr. J. N. Nicholson, Assoc.M.Inst.C.E., 19, Tanfield Chambers, Bradford, on and after August 28, on payment of a deposit of one guinea, which will be refunded on receipt of a *bona-fide* tender and the return of all documents.

Sealed tenders, endorsed "Sewage Works," must be delivered to the undersigned not later than noon on September 8.

The Council do not bind themselves to accept the lowest or any tender.

(Signed) I. LINDOW,
Clerk to the Council.

District Council Offices, Shipley, Yorks,
August 19, 1914.

COUNTY OF LONDON.

The London County Council invites tenders for the manufacture, delivery, and erection of Induced Draft Fans, Motors, Spare Parts and Dampers, and for the execution of alterations to existing brickwork flues and the moving of existing dampers at the Council's Generating Station at Greenwich.

The specification, form of tender, etc., may be obtained on application to the Clerk of the Council, at the County Hall, Spring Gardens, S.W., after payment to the Cashier of the Council of the sum of £2. This amount will be returnable only if the tenderer shall have sent in a *bona-fide* tender, and shall not have withdrawn the same. Particulars may be obtained at the County Hall before the payment of the fee.

The person whose tender is accepted will be bound by the contract to pay wages at rates not less, and to observe hours of labour not greater, than the rates and hours set out in the Council's list. Particulars of the Council's Standing Orders as to its conditions of tender and contract are given in every issue of the *London County Council Gazette*. No tender received after 11 a.m. on Tuesday, September 22, 1914, will be considered.

The Council does not bind itself to accept any tender.

LAURENCE GOMME,
Clerk of the London County Council.

County Hall, Spring Gardens, S.W.

NORTH-EASTERN RAILWAY.

TO BUILDERS.

The Directors are prepared to receive tenders for the Erection of an Electrical Shop at the Carriage Works, York. Plans and specification may be seen and quantities obtained upon application to Mr. William Bell, the Company's Architect at York, on and after August 24. Quantities supplied on personal application to parties tendering for the whole of the works. Sealed tenders, marked "Electrical Shop, York," to be sent to the Secretary at York not later than 9 a.m. on Tuesday, September 8. The Directors do not bind themselves to accept the lowest or any tender.

R. F. DUNNELL,
Secretary.

York, August 18, 1914.

COUNTY BOROUGH OF SOUTHEND-ON-SEA.

The Corporation of Southend-on-Sea invite tenders for the supply of Coal for a period of one year from October 1, 1914. Form of tender may be obtained upon application to Mr. Ernest J. Elford, M.I.C.E., Borough Surveyor, Municipal Buildings, Southend-on-Sea.

Sealed tenders, endorsed "Tender for Coal," to be delivered at my Office not later than Wednesday, September 2, at 9 a.m.

No tender will be considered unless made on the prescribed form.

The Corporation will not be bound to accept the lowest or any tender.

(By order), H. J. WORWOOD,
Town Clerk.

Town Clerk's Office, Southend-on-Sea,
August 25, 1914.

WHITBY URBAN DISTRICT COUNCIL.

TO CLIFF TRAMWAY AND LIFT MANUFACTURERS.

The Whitby Urban District Council contemplate the provision of a Cliff Tramway, or a Lift, from the beach to the top of the cliff, and invite schemes, with quotations, for the execution of the work.

The undercliff measures—at probable position of tramway or lift—about 250ft. horizontally, and 130ft. vertically.

Schemes and quotations must reach the Clerk to the Council before September 30, 1914.

The Council do not bind themselves to accept any tender or scheme.

THOS. KEAT SCOTT,
Surveyor.

Offices of U.D. Council, Whitby, Yorks,
August 13, 1914.

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COUNTY BOROUGH OF WARRINGTON.

ELECTRICITY DEPARTMENT.

The Electricity and Tramways Committee of the County Borough of Warrington invite tenders for twelve months' supply of Earthenware Conduit.

Specification and form of tender can be obtained from the undersigned on payment of one guinea, which will be returned on receipt of a *bona-fide* tender. Five shillings each will be charged for extra copies of specification.

Tenders, addressed to the Chairman of the Electricity and Tramways Committee, Town Hall, Warrington, must be sealed with wax and endorsed "Tender for Earthenware Conduit," and delivered not later than 12 o'clock noon on Tuesday, September 15, 1914.

The lowest or any tender will not necessarily be accepted.

F. V. L. Mathias,
Borough Electrical and Tramways Engineer.

Howley, Warrington.

POSITIONS VACANT.

COUNTY BOROUGH OF SWANSEA.

APPOINTMENT OF ELECTRICAL ENGINEER.

The Corporation of Swansea invite applications from duly qualified Electrical Engineers under 45 years of age for the appointment of Resident Borough Electrical Engineer.

Salary, £500 per annum.

Applications, stating age, qualifications and experience, accompanied by copies of not more than three testimonials (which will not be returned), endorsed "Borough Electrical Engineer," to be sent to me, the undersigned (from whom the particulars of the duties of the office can be obtained), not later than 12 o'clock noon on Tuesday, the 15th day of September, 1914.

Canvassing, either directly or indirectly, is strongly objected to and is strictly prohibited, and any candidate pursuing the practice will be disqualified.

H. Lang Coath,
Town Clerk.

The Guildhall, Swansea,
August 21, 1914.

SOUTH INDIAN RAILWAY.

The South Indian Railway requires the services of a fully-qualified Electrical Engineer to take Charge of the Electric Lighting of Trains and the Installation of Electric Driving in the Company's Locomotive Shops.

Candidates, who may be between the ages of 25 and 35, must, in addition to electrical knowledge, have had a mechanical training. They must have had practical experience of electrical train lighting and the application of electricity to the driving of workshop machinery.

The salary will commence at the rate of Rs. 500 per mensem, and rise by annual increments of Rs. 50 to Rs. 700 per mensem.

The engagement is to be for 5 years, and the passage to India will be paid by the Company.

Applications, in writing only, to be addressed to Mr. Robert White, Consulting Engineer to the South Indian Railway Company, 3, Victoria Street, Westminster, S.W.

BOLTON CORPORATION TRAMWAYS.

Wanted, Leading Hand in Armature Shop; man able to wind armatures, repair controllers, and take charge of all electrical repairs for traction shop. Permanency and good wages to suitable man.

Apply, stating age, experience and wages required, to Mr. John Barnard, General Manager, Bradshawgate, Bolton.

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BRANCH OFFICES AND AGENCIES Established at Brussels, Christiania, and Stockholm.

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THE
Tramway AND Railway World

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THE "OCEAN"
ACCIDENT AND GUARANTEE CORPORATION, LTD.,
IS THE
PREMIER INSURER OF TRAMWAYS
HEAD OFFICE:
MOORGATE STREET, LONDON, E.C.

TO KEEP EMPLOYMENT GOING.

It may be useful to emphasise some ways in which those engaged in the tramway and allied industries may check tendencies to unemployment so far as they are concerned. In regard to the industries of the country generally, much more can be said for the exhortation, "Business as usual," than for many other popular catch phrases. As a nation, we have to try to carry on our business as usual, and this idea recalls to the minds of most men its shop-keeping complement, "during alterations and extensions." There is not the slightest doubt that British business, as the result of the war, will be altered and extended. To the electrical trades, which are so largely bound up with tramways, a grave warning is given to purchasers in the recent letter from the British Electrical Manufacturers' Association. It certainly seems an extraordinary thing, at a time when on every hand one hears of the efforts to keep industry going and to prevent unemployment, that any purchasers of electrical plant should try to suspend or delay work. The letter aptly points out how disastrous to the working classes the results would be were such a policy of delay to become common practice. The British electrical trades, however, as we showed last week, have good prospects ahead. The larger companies are not likely to be much embarrassed by the reluctance of the joint stock banks to make advances for extensions of manufacturing business, and as regards smaller firms the pressure which is being brought to bear should produce a good result. In this way we should have increased, not diminished, employment in British electrical industries. Meantime, in many kinds of labour, there is some dislocation, and though—all going well with the coalition in the war—it is likely to be quite temporary, it behoves employers who can do so to provide work as far as possible. The owners of tramway undertakings can do a good deal; for many miles of tramways have been authorised and have not yet been constructed. Except in some cases where it is proposed to abandon them, tramway authorities can put the construction work in hand and thus give employment to permanent-way men, makers of rails and of electrical equipment, and of all the other things required. In many places old track is getting near the time for reconstruction; the work can be put in hand now. Then there are no doubt a number of tramway authorities who have contracts for the supply of materials or machinery with German firms. All these contracts are null and void, and fresh orders should be given at once to British firms. Much can also be done in the reconstruction of roads and in the making of new roads, and the Road Board promises to unlock its hoarded millions to help. The money has been accumulated for carrying out work in periods of trade depression, so that it can appropriately be applied now. It is also encouraging to note that large building works in contemplation by public bodies are to be pushed forward. This fact, together with the arrears caused by the building strike, and with the Government's great housing scheme, should produce a period of great activity in building. In the direction also in which our readers are primarily concerned, there are good reasons to look for a period of considerable activity in tramway construction and equipment. Manufacturers must, however, do their part and spare no effort to secure orders from sources which have hitherto been tapped by our enemies.

THE WAR AND TRACTION INDUSTRIES.

WHEELS AND AXLES.

The Commercial Intelligence Branch of the Board of Trade are continuing their work of issuing a valuable series of pamphlets giving for various trades particulars of German and Austrian as well as British exports, together with notes on Colonial and foreign markets, with the object of helping British manufacturers to acquire a large share of the German and Austrian trades which have been cut off by the war. Last Saturday we summarised the brochure relating to electrical machinery and appliances. Among the pamphlets issued this week is one dealing with railway wheels and axles (complete) and tyres and axles. It is evident that tramway wheels, tyres, and axles are included.

The value of railway axles, parts of railway wheels (hubs, tyres, frames, etc.), railway wheels, and sets of railway wheels exported from Germany to all destinations in the year 1912 was £1,377,000. The 18 countries receiving the larger amounts included the following:—United Kingdom, £40,000; British India, £60,000; Canada, £90,000; Australia, £190,000; France, £40,000; Italy, £275,000; China, £62,000; Japan, £88,000; Brazil, £63,000. The aggregate value to the 18 countries was £1,095,000. An Austrian export trade in this class of goods practically does not exist. The British exports to the same countries, the United Kingdom, of course, excluded, totalled £1,210,000, the largest items being the following:—British India, £461,000; Australia, £284,000; Argentina, £285,000; Brazil, £50,000. To the other countries the amounts are small.

The Board of Trade proceed to say:—The aggregate British exports to the above markets therefore exceed those of Germany, but while the United Kingdom easily takes the first place in supplying these goods to British India and Argentina, Germany takes the bulk of the trade in the other markets specified. It should be possible at the expense of Germany materially to increase our exports to Canada, Australia, Scandinavia, Southern Europe (particularly Italy and France), to the Dutch East Indies, China and Japan, and Brazil.

Competition from Germany with British manufactures of railway axles, wheels, and tyres during the last few years has been extremely keen. In many foreign and colonial markets, but particularly in the various Dominions, large contracts have been placed with German manufacturers. It is obvious that a number of the contracts which were under execution or which had just been placed in Germany before the war, cannot now be fulfilled in that country. In the case of Australia, where competition from Germany in this class of material has recently been severe, the Board of Trade have heard by cable from H.M. Trade Commissioner in Melbourne that the Federal Government have decided to continue the execution of their Public Works. When conditions

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become more settled in other neutral markets, a considerable amount of work now let to German manufacturers will probably come into the market, and it will therefore be advisable for British manufacturers to strengthen their position in those markets where German competition has been most seriously felt in order that they may be able to take advantage of such opportunities.

In the notes relating to various oversea markets the following interesting passages occur regarding the market for tramway wheels and axles in Adelaide, South Australia.

H.M. Trade Commissioner for Australia recently wrote as follows regarding purchases of tramway wheels and axles :—

"During my recent visit to Adelaide, the chief engineer and general manager of the Municipal Tramways Trust promised to give me particulars of tenders received, with the names of the successful tenderers, for material required during the last three years, including amongst other items gear wheels and axles. The total amount of the purchases by tender from oversea manufacturers was over £77,000, of which an order for wheels and axles for maximum traction trucks accounted for £1,057 10s., and orders for 275 gear wheels and 250 axles for £945 6s. 3d. and £810 8s. 4d. respectively. Messrs. Krupp tendered as follows for the wheels and axles for maximum traction trucks :—

	£ s.
"1. To specification, plus £60 for Krupp's special light-weight centres—mileage guaranteed as follows. Drawing tyres 60,000 miles. Pony tyres	1,333 0
"2. Axles, special steel, centres and tyres to specifications, plus £60 as above	1,374 0
"3. Axles and centres to specification special steel, plus £60 as above	1,471 0
"4. Axles and tyres, special steel, plus £60 as above ...	1,612 5

"Messrs. Krupp did not secure this contract, but succeeded in obtaining that for the supply of 250 axles, their price being £3 4s. 10d. per axle, with delivery in 25 weeks, against £3 10s., with delivery of 125 in 12 weeks, the lowest British tender."

MISCELLANEOUS NEWS AND NOTES.

Tramway Work During the War.—Leicester Tramways Committee, in order to provide employment, propose to commence the extension of the tramways on the Overton and Evington roads.

Rochdale Loan Sanctioned.—The Board of Trade have sanctioned the application of Rochdale Town Council for a loan of £17,000 for the construction of a tramcar shed and workshop in Mellor Street.

The Light Railway Commissioners announce that on and after August 25, 1914, the address of the offices of the Commission will be 49, Wellington Street, Strand, London, W.C. The telephone number is 5872 Regent.

P.A.Y.E. Cars at Aberdeen.—At the last meeting of the Town Council the Tramway Committee's recommendation for the purchase of six new P.A.Y.E. cars at a cost of £4,284 was sent back for further consideration.

Tramway Retaliation in Brussels.—According to newspaper reports the Germans in occupation of Brussels have appropriated the tramway takings each night. The tramway company, however, retaliated by carrying the public free.

Women Conductors in Germany.—The *Gazette de Hollander* says that in Berlin and Hanover only women tramway conductors are now to be seen, while old men are acting as drivers. It is reported that the wages of tramway employees have been reduced 30 per cent. throughout Germany.

Rolling Stock Additions at Birkenhead.—During the last financial year six cars were purchased from Messrs. Siemens Bros. for use on the New Ferry route at a cost of £4,374. These cars were charged to capital account as was also the equipment of six cars with new tops, the working being done in the car shops of the department.

South Shields Electric Omnibuses.—The two electric accumulator omnibuses, which were put into service on July 30, have run very satisfactorily under all conditions. They are extremely popular in the district which they serve, and have been inspected by deputations from several towns who are investigating the merits of the electric omnibus.

Weather Screen Experiments.—About a year ago at the request of some of the drivers on the Birkenhead tramways experiments were made with two types of weather screens for the protection of drivers, one a patented design and another made in the tramways department. Neither were found satisfactory, and they were removed from the cars.

German Firms' Changed Names.—In the House of Commons on Wednesday, Mr. Runciman (President of the Board of Trade), in reply to a question, said that inquiries were being made with regard to German firms trading in this country which had changed their names. He assured the House that the matter would have his very careful consideration.

Faraday Day House College.—In view of the large withdrawal of engineering students from Continental colleges and works on account of the war, the Governors of Faraday House Electrical Engineering College are willing to offer special arrangements to those who wish to join the College. They are prepared to take into consideration as far as possible the time already spent abroad, and to shorten proportionately the four years' course ordinarily required for the diploma. Students would complete their practical training in large engineering works and power stations in the United Kingdom.

Melbourne Railway Electrification.—It is not expected that the electrification of the first Melbourne suburban railway will be completed until the end of 1915. This is a delay of about six months, and according to Australian newspapers it is due to unsatisfactory tenders for switchgear. These are of a complicated design, and fresh tenders have been invited.

Elephant and Castle to Watford.—The inauguration of through electric train services from the Elephant and Castle to Watford will, it is expected, take place before the end of the year. This will be the first route in the inter-communication scheme between the London underground railways and the electrified suburban lines of the London and North Western Railway.

Special Cars.—Mr. S. W. Holford, general manager of Salford Corporation tramways, mentioned in his last annual report that there was a considerable increase in the number of special cars provided for Sunday school treats and other purposes. The number was 344 as compared with 278 in the previous year, the revenue thus earned being £452, an increase of £90.

"Don't Worry."—The Ediswan Company write that if they could coin a phrase out of the mottoes they have recently seen it would be "Don't worry—work and keep on with it during the alteration of the map of Europe." The staff of employees in the lamp manufacturing section is being added to daily, and full time is being worked owing to increased orders for Royal Ediswan lamps.

The New Liverpool Tramcar.—There are now about thirty of the new type of car designed by Mr. C. W. Mallins, general manager of Liverpool Corporation tramways, in service, and ten others are approaching completion. This type of car, which has been received with much favour, has separate entrance and exit staircases, transverse seats on both decks, a long wheel base and a seating capacity for 73.

Motormen's Promptitude Rewarded.—Two of the Birmingham Corporation motormen have been complimented by the chairman of the Tramways Committee (Mr. Harrison Barrow) and awarded £1 each for individual smart actions. Driver Goode pulled his car up and avoided a woman who was unconsciously walking backwards into danger, and by similar action on another occasion he saved the life of a child who had run in front of the car. Driver Tustin by promptly stopping his car avoided running into a motor omnibus and a motor cycle, which had collided.

Pennine Tramway Scheme.—A light railway scheme is being forwarded by Mr. Lawton, of New Moston, Failsworth, having for its object the construction of 52 miles of tramway on the Pennine ridge. The line would link up the hill termini of the Rochdale, Stalybridge, Hyde, and Oldham tramways, and it has been suggested that those undertakings would supply the current on favourable terms, as the traffic being mainly of a pleasure character would be carried at a time when the power demands of those tramways are at their lowest. The scheme owes its origin to the popularity of the routes serving the hill district.

National Service and Electrical Engineers.—The Institution of Electrical Engineers has received offers of service from over one thousand members and others in response to a circular recently sent out. A circular letter is now being sent to engineers of all the electric supply undertakings in the United Kingdom stating that a large number of electrical engineers have offered their services (subject to various periods of notice) to fill vacancies in connection with the public services, electric power stations, tramways, railways, etc. These names have been classified by means of index cards under various headings, and are at the disposal of supply undertakings should any of the men's services be required.

Joint Plates to Reduce Noise.—In his report for the past year Mr. W. Marsh, the engineer and manager of Brighton Corporation tramways, says :—"Manganese steel plates to the number of four hundred were fixed on the joints in Queen's Road and the lower end of Dyke Road, much to the satisfaction of those who live on the routes so dealt with. The reduction in the noise made by the cars was most marked; and it necessarily follows that the life of the rails must be prolonged in consequence." Thirty-one trucks had now been replaced with those of the Brill type. Only five axles were broken, as against forty or fifty some years ago. This trouble now appears to be a thing of the past, the cure for it having been found.

Stirling Tramways Purchase.—The directors of the Tramways Company have offered to sell their undertaking to the Town Council for £15,000, but as Mr. Peter Fisher, general manager of the Dundee Corporation tramways, and Mr. Goudie, the borough surveyor, valued the tramway plant and assets of the company at £8,075 1s. the directors of the company were asked to reconsider their proposal. The County Council have consented to the Town Council promoting a Provisional Order for the acquisition and construction of the tramway subject to certain conditions and providing that the County Council shall have power to purchase the undertaking in 1940 at a valuation, plus, say, three years' profits, in 1947 at valuation, and in 1954 under the terms of the Tramways Act.

B.T.-H. Lamps.—It should be a matter of great satisfaction to all electric light users to know that, since the first introduction of the drawn wire incandescent lamp in 1911, all the tungsten wire used in the manufacture of Mazda lamps has been produced in the Rugby factory of the British Thomson-Houston Company, Limited, who are, therefore, absolutely independent of any other country for their supply of incandescent lamp filaments. This fact places them in an excellent position to meet the utmost demands which can be made upon their resources, as the supply of Mazda lamps will not be in the slightest degree affected by current events.

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The announcement in August of last year of the discovery of the half watt lamp has been followed by the wide-spread installation of these highly efficient lamps for outdoor illumination, most of the lamps used being, however, of German manufacture. The B.T.-H. Company's Rugby factory has been busily engaged in the manufacture of these important lamps during the whole of the past year, and British made Mazda half watt lamps are now available in commercial quantities. All B.T.-H. lamps—whether metal or carbon filament—are of British manufacture.

British Car Ferry for Canada.—The official speed trials of the car ferry and ice-breaking steamer, built by Cammell, Laird, at Birkenhead, for the Transcontinental Railway Company of Canada, were successfully completed off the Mersey on July 28. The vessel is intended for service on the St. Lawrence between Quebec and Lewis. Arranged above the main deck is a tidal deck, on which the trains are carried, and which has three lengths of track, each about 270ft. long. Gearing can raise or lower this deck at the rate of one foot per minute to any level up to about 20ft., so as to allow of trains being shipped or unshipped at any state of the tide.

Theft from a Tramway Company.—A peculiar case of theft from Edinburgh and District Tramway Company came before Edinburgh Police Court on August 14, when a man was fined £5, with the alternative of 20 days' imprisonment, for having stolen during a period between April 1 and August 11 101 tunics, 20 greatcoats and 13 pairs of trousers from a store belonging to the tramway company. It was stated that he had been a car driver, and he had been employed from time to time in the company's clothing store. A shoemaker who kept a shop admitted having purchased the garments from an employee of the tramway company, who had said that he was the company's tailor. He had paid £3 7s. in all, giving 6d. for each garment. The cloth of the garments, which were worn and old, was used for making slippers.

Railways and Motive Power.—Among the papers read before the Engineering Section at the British Association meeting in Australia was one on "Railways and Motive Power," by Prof. W. E. Dalby, F.R.S. Various curves relating to the development and cost of working of English railways were shown. The advantages of the locomotive and the electric motor were compared. Curves were also shown illustrating the proportion of fuel actually used to draw a train, as compared with the quantity fired in the furnace of a steam locomotive and in the furnace of a central electric station supplying energy for traction. Other curves illustrated the limits of economy and speed of a steam locomotive and the electric motor compared together in relation to the problems presented by suburban traffic.

The Screw Jacks on the Manchester Cars.—An inquest was held recently on a child aged two years, who was found under the cradle of the lifeguard of a tramcar. No one saw how the accident happened, and the motorman said he did not know the child was there until someone shouted to him. The jack was got out, the driver said, but it could not lift the car. Seeing that the jack could not lift the car, the public got round and lifted it bodily. The child was dead when taken out. The jury returned an open verdict and they expressed the opinion that the Corporation should take these jacks into consideration, especially after the number of cases reflecting on their efficiency which had occurred. Mr. Derbyshire (for the Corporation) said the jacks were quite strong enough to lift the cars. The suggestion was that on such occasions drivers got excited. The Corporation had now got permission to put guards under the steps of tramcars. Some cars already had these guards.

CONTRACTS AND ORDERS.

Sunderland Corporation have accepted the tenders of the British Insulated and Helsby Cables, Limited, and the India Rubber Gutta Percha and Telegraph Works Company for cables.

Messrs. Siemens Bros.' Dynamo Works, Limited, have been awarded a contract by the London County Council for 125,000 Tantalum traction lamps. The same firm have a contract for a twelve months' supply of Wotan drawn-wire tungsten lamps for H.M. Office of Works.

A Diesel Engine Contract.—Wallasey Corporation and Messrs. Mirrlees, Bickerton and Day, by a friendly arrangement, have put an end to the contract of April, 1912, for a Diesel engine-driven alternator. The company will take back the Diesel engine and the Corporation will retain the alternator at the price of £948. Since the contract was entered into, conditions have changed considerably, and the Corporation has embarked upon a large new steam-driven station.

Johannesburg Town Council has accepted a tender for five miles of 4·0 trolley wire at £473 from the United States Product Company. Other tenders were as follows:—W. T. Henley's Telegraph Works Company, £491; British Insulated and Helsby Cables, £481; A.E.G. Company, £488; Rice and Wilson, £505; Siemens Brothers and Company, £506; W. Hosken and Company, £520. The Corporation have also accepted the tender of W. T. Henley's Telegraph Works Company, Limited, at £262 10s. for 1,000 sets of single pole cut-outs complete with sealing chamber.

PERSONAL.

Mr. J. Pedriali, the general manager of the Anglo-Argentine Tramways Company, is at present on a visit to this country.

Mr. Charles Stafford Schultz, a director of Messrs. Dick, Kerr and Company, Limited, who is a British subject born at Ingersol, Ontario, announces that on August 14, 1914, he renounced the surname of Schultz, and adopted the name of Charles Stafford Stafford.

Mr. H. P. Maybury, who became chief engineer to the Road Board in November last, has been appointed to a new post with the title of manager and engineer.

Mr. R. H. Sperling, on resigning the position of general manager of the British Columbia Electric Railway Company, Limited, was presented by the office staff and employees with a gold cigar box and a large framed group photograph of the employees. Mrs. Sperling received a five stone diamond ring enclosed in a gold casket. The presentations were made at the Vancouver office of the company in the presence of about 400 members of the staff and their families. A farewell banquet was given to Mr. Sperling at the Hotel Vancouver, when Mr. Sperling said that while he was leaving British Columbia with deep regret, he felt that in London he might be able, understanding the conditions now prevailing throughout the company's field, so to advise that the best interests of the company would be served by the action of the London board.

FINANCIAL REPORTS AND MEETINGS.

Llanelly and District Electric Lighting and Traction Company, Limited.—An interim dividend on the preference shares for the half-year to June 30, at the rate of 6 per cent. per annum will be paid.

Oldham, Ashton and Hyde Electric Tramway.—In view of the circumstances arising out of the present war, the directors have postponed the interim dividend on the ordinary shares. The half-yearly dividend on the preference shares is paid as usual.

Stewarts and Lloyds.—The directors have declared interim dividends for the half-year ended June 30 at the rate of 6 per cent. per annum on the preference shares and 10 per cent. per annum on the preferred ordinary shares and a dividend of 6d. per share on the deferred shares, to be paid on August 31. A year ago no dividend was paid on the deferred shares.

Guest, Keen and Nettlefolds, Limited.—The directors announce the payment of final dividends as follows:—On the preference shares at the rate of 5 per cent. per annum for the half-year ended June 30, and on the ordinary shares at the rate of 10 per cent. per annum for the half-year ended June 30, together with a bonus of 1s. per share on the ordinary shares, all free of income-tax.

Southampton Corporation Tramways.—The accounts for the year ended March 31 last show that the total revenue was £70,598 (equal to 10.974d. per car mile) and the working expenses £46,521 (7.231d. per car mile), leaving a balance to net revenue account of £24,078. An amount of £7,118 is transferred to depreciation and renewals fund, and after paying interest, sinking fund, etc., there remains £2,360 which is transferred in aid of the rates.

Kirkcaldy Corporation Tramways.—For the year ended May 15 this undertaking had a gross profit of £6,495, as against £6,158 the previous year, and after the payment of interest, sinking fund, and depreciation, the net profit was £841. Receipts amounted to £17,947, and the working expenses £11,454. From the electricity undertaking there was a gross profit of £4,251 and a net deficit of £186. Current for the tramways was charged at 1d. per unit. The tramway receipts averaged 8.936d. per car mile. Passengers numbered 5,781,895, made up of 54.13 per cent. of halfpenny fares, 10.07 per cent. of workpeople at halfpenny fares, 26.90 per cent. of 1d. fares, .80 per cent. of workpeople at 1d., 8.04 per cent. of 1½d. fares, and .06 per cent. at 2d. Of the capital account of £96,748, the sum of £18,880 has been repaid.

Aberdeen Corporation Tramways.—The report of the general manager, Mr. R. Stuart Pilcher, for the year ended March 31 last, states that the total revenue was £85,267, being an increase of £5,100 compared with the previous year. The total is the highest figure yet obtained, and the increase is the greatest ever obtained in one year. The working expenses amounted to £47,036, being an increase of £3,830. The increase is due to 93,621 additional miles having been run, the increase in wages granted to employees, and the increased cost of material. After allowing for interest, sinking fund, depreciation and renewals, there remains a net profit of £14,062, being an increase of £1,537. This profit is the largest ever obtained, and the whole of it is available for the reserve fund. This reserve fund now amounts to £29,507, and the depreciation and renewal fund to £140,480. The number of miles run were 1,832,587, and the passengers carried were 22,218,142. The number of units per car mile was 1.184 as compared with 1.213, and the cost of energy was 8d. per unit. The revenue per car mile was 11.17d. and the working expenses 6.16d.

Manaos Tramways and Light Company.—At the annual meeting held in London on Wednesday, Mr. G. M. Booth, who presided, said that the world of finance and commerce was completely disorganised, and the future of all companies somewhat obscure. With them the obscurity was deepened by the problem of Brazilian exchange. In regard to the State debt for public lighting, their efforts to collect this had not met with any success. The amount of the debt due to them on April 30, 1914, was £33,898, and, he feared, present conditions would further postpone a settlement. The accounts for the year under review showed tramway receipts amounting to £87,029, against £106,148 for the previous year, a decrease of £19,119. The lighting receipts amounted to £44,305, against £44,148 for the previous year, an increase of £247, their total gross income decreasing from £151,741 to £132,877. The total operating expenses decreased from £101,042 to £96,848, and their net surplus had decreased from £28,107 to £14,426, or over 48 per cent. The directors recommended the transference of £8,000 to the contingencies and accident reserve account, and to the renewals reserve £6,000. The balance of £3,861 they proposed to carry forward. The report was adopted.

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Brazilian Traction, Light and Power Company.—The directors have declared a dividend of 1½ per cent. on the issued ordinary capital stock. A circular issued to the shareholders states that there is not the least foundation for the various rumours, or any ground for uneasiness, with reference to the company's affairs. Statements have been circulated both by the Brazilian company and by Guinle and Co. concerning the competition that the latter will offer next year through their Companhia Brazileira de Energia Electrica, in Rio de Janeiro.

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 59 of the principal undertakings of the United Kingdom for the week ended August 22 give total receipts of £235,308, or £473 less than in the corresponding week last year. The total length of track was 2,832 miles, or 24 more than for the corresponding week. Receipts were at the rate of £83 1s. 9d. per track mile, a decrease of 17s. 7d. as compared with the corresponding week of last year.

THE BRITISH ELECTRICAL FEDERATION.

The traffic statement for the week ended August 22, 1914, shows that the receipts from tramways and railways amounted to £41,304 as compared with £43,513 in the corresponding week last year, and from omnibuses £16,633, as compared with £12,445, making a total of £57,937, as compared with £55,958. The tramway and railway route mileage was 430.54, as compared with 428.47. Upon such of the services as were working both last year and this year the receipts show a decrease of £2,045 upon the week.

THE STOCK AND SHARE MARKET.

As the Stock Exchange is still closed it is impossible to give our usual Tramway and Omnibus Share List. This list was last published in our issue of August 1. In the meantime there have been very few transactions in tramway shares. Business is now and then privately arranged, but prices are not published. Some time will probably elapse before the Stock Exchange can be opened for business as usual, but it is desirable that it should now be opened for cash dealings under strict supervision. Because the ordinary market system has broken down, is no reason why the public should not be given such facilities as are possible. If the explanation of the delay in making the necessary arrangements is that some Stock Exchange firms think more of their present profit than of the broader needs of the general business community, it is time that some higher authority should intervene.

METAL AND COAL MARKETS.

Owing to the war and the consequent dislocation of the markets no quotations for copper and aluminium or coal are available. The last quoted copper and aluminium prices were given in our issue of July 25, and coal prices in our issue of August 1.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	1913-4.	Aggregate. Wks.	1913-4.	Increase or Dec.
Anglo-Argentine	Aug. 19	£53,957	£44,691	33	£1,820,506	— £13,638
Auckland..... (28 days)	July 31	18,960	20,782	4½	23,311	+ 1,244
Ballarat and Bendigo	June 21	3,178	3,158	12	11,240	+ 95
Brazilian St. Rly. Mlrs.	May	44,820	50,237	43	523,872	+ 76,626
Brazilian Traction.....	July 25	95,720	97,133	4	388,200	+ 8,334
Brisbane	July	26,205	29,680	31	198,655	+ 21,447
British Columbia .....$	June	680,693	660,383	52	8,789,287	+ 297,048
Buenos Aires Pt. & City	May	6,925	6,713	22	36,517	+ 3,206
Buenos Aires Lacroze...	July	45,221	43,327	4	43,327	— 1,894
Calcutta.....Rs.	Aug. 22	63,772	67,300	33	22,88,141	+ 1,28,447
Cape Town	June	11,560	12,742	52	155,466	+ 13,249
Carthagena & Herrerias	July	3,794	2,416	30	16,212	— 4,913
Cordoba.....	June	13,416	13,883	13	41,977	+ 1,915
East India	July	1,892	1,966	48	21,090	+ 809
Kalgoorlie.....	June	2,854	2,692	26	15,522	— 1,704
La Plata.....	July	4,770	4,359	30	33,603	— 2,739
Lima.....	June	31,210	33,310	26	207,160	+ 9,021
Lisbon ..... Mlrs.	June	176,170	169,311	26	971,885	+ 39,374
Madras (14 days) Rs.	Aug. 15	27,034	28,340	31	436,109	+ 33,988
Manila.....	June	133,500	132,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	387,500	+ 7,000
Mexico .....$	July	610,602	628,206	31	4,158,751	+ 282,609
Montevideo.....	July	29,189	26,417	39	283,663	— 3,939
Para	July	23,686	20,169	35	170,592	— 34,012
Port Elizabeth.....	June	3,268	3,212	52	44,931	+ 1,901
Puebla .. .. $	June	61,300	62,000	26	380,800	+ 25,900
Rangoon	June	4,807	4,997	26	32,334	+ 982
Shanghai .....$	July 22	23,192	25,400	29	695,740	+ 100,778
Singapore .....$	July 25	12,486	11,520	29	356,905	+ 5,622
Toronto .....$	June	815,206	861,938	26	5,025,926	+ 370,440
Winnipeg.....$	June	321,037	335,012	26	2,091,552	+ 119,178

The Tramway & Railway World can be obtained, post free, at the following rates:—

For the United Kingdom—Twenty-five Shillings per annum (including 64 issues, of which 12 are large illustrated numbers). One Shilling per Single Copy.

For places abroad—Thirty Shillings per annum.

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Telegraphic Address: "**Tramigro,**" **London.** NORFOLK ST., W.C.

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913-	1914.	Incr. or Dec.	Aggregate. Wks.	1913-4.	Increase or Dec.
Aberdeen Corporation..	Aug. 19	£1,861	£1,745	— £116	12	£21,866	+ £1,427
Accrington Corp.....	,, 5	541	507	— 34	18	11,024	+ 404
Ayr Corporation	,, 22	588	516	— 72	14	7,326	— 15
Bath Electric	,, 12	1,615	1,026	— 589	32	31,786	+ 1,787
Birkenhead Corp.	,, 23	1,274	1,276	+ 2	20½	26,896	— 444
Birmingham Corp.	,, 22	11,275	11,140	— 125	21	258,493	+ 19,814
Blackburn Corporation	,, 19	1,319	1,624	+ 305	21	29,670	+ 1,786
Blackpool Corporation	,, 20	4,962	2,673	— 2,289	21	45,538	+ 1,358
Bolton Corporation	,, 23	2,725	2,908	+ 183	21	59,927	+ 2,331
Bournemouth Corp.....	,, 26	3,031	2,183	— 848	21	48,074	— 170
Bradford Corporation..	,, 22	6,207	7,450	+ 1,243	21	135,380	+ 9,176
Brighton Corporation..	,, 23	1,538	1,276	— 262	20½	25,723	+ 587
Bristol	,, 21	9,269	8,776	— 493	33½	289,506	+ 20,379
British Elec. Federatn.	,, 22	55,958	57,937	*	...	...	...
Burnley Corporation ..	,, 22	1,684	1,524	— 160	21	35,376	— 807
Burton-on-Trent Corp.	,, 23	302	307	+ 5	21	6,486	+ 321
Bury Corporation.....	,, 23	1,286	1,565	+ 279	21	30,032	+ 1,216
Cardiff Corporation.....	,, 8	3,530	3,371	— 159	18	54,870	+ 2,580
Chatham and District..	,, 20	1,099	992	— 107	33	30,885	+ 458
Chesterfield Corp.	,, 20	266	263	— 3	19	5,848	+ 471
Colne Corporation	,, 22	303	276	— 27	...	...	...
Cork Electric.....	,, 20	579	554	— 25	33	16,770	+ 164
Croydon Corporation ..	,, 14	1,615	1,668	+ 53	19	35,642	+ 2,343
Darlington Corporation	,, 22	240	262	+ 22	21	5,608	+ 359
Derby Corporation	,, 22	1,002	1,037	+ 35	20½	22,068	+ 1,230
Dover Corporation	,, 22	403	270	— 133	21	5,511	+ 23
Dublin & Lucan	,, 21	211	157	— 54	7½	1,317	— 152
Dublin United	,, 21	6,655	6,309	— 346	33	196,970	— 4,694
Dundee City	,, 12	1,265	1,244	— 21	12½	17,361	+ 444
East Ham Corporation	,, 22	975	1,294	+ 319	20½	23,079	+ 2,294
Exeter Corporation	,, 21	405	356	— 49	21	7,794	+ 337
Gearless Motor 'Buses.	,, 22	602	550	— 52	34	15.831	+ 6,766
Glasgow Corporation ..	,, 22	19,653	19,775	+ 122	11	242,341	+ 10,471
Glossop (U. Elec. Supply)	,, 22	128	168	+ 40	34	4,306	— 70
Halifax Corporation ..	,, 18	2,366	3,185	+ 819	20	47,436	+ 3,065
Hastings & District.....	,, 19	1 783	1,243	— 540	32	38,722	— 541
Huddersfield Corp.	,, 22	2,145	2,349	+ 204	21	70,234	+ 5,517
Hull Corporation	,, 22	3,046	2,786	— 260	21	65,962	+ 2,016
Ilford U.D.C.	,, 22	453	638	+ 185	20	11,687	+ 2,100
Ilkeston Corporation ...	,, 26	145	133	— 12	21	2,875	— 26
Ipswich Corporation ..	,, 22	586	474	— 112	21	10,461	+ 456
Isle of Thanet	,, 22	2,141	1,201	— 940	45	28,210	— 1,274
Kilmarnock Corp.	,, 22	170	155	— 15	14	2,534	— 107
Lanarkshire	,, 20	1,795	1,945	+ 150	33	63,090	+ 7,928
Lancashire United	,, 19	1,716	1,811	+ 95	33	54,999	+ 5,068
Leeds City	,, 22	8,386	8,276	— 110	21	179,014	+ 5,884
Leicester Corporation..	,, 22	2,789	2,653	— 136	34	98,106	+ 4,461
Leith Corporation	,, 22	729	711	— 18	14	11,178	+ 551
Leyton U.D.C.	,, 13	1,280	1,476	+ 196	18	27,929	+ 1,512
Liverpool Corporation..	,, 22	13,271	13,496	+ 225	33½	444,986	+ 13,275
Llandudno & Colwyn B.	,, 21	891	510	— 381	38	11.774	— 1,008
London County Council	,, 19	40,360	43,353	+ 2,993	20	892,649	+ 44,366
London Gnl. Omnibus..	,, 1	68,575	71,625	+ 3,050	31	1,982,031	+ 64,894
London United	,, 21	7.331	6,628	— 703	34	212,063	— 702
Lowestoft Corporation	,, 22	549	309	— 240	46	10,007	+ 518
Maidstone Corporation	,, 20	229	222	— 7	21	4 676	+ 298
Manchester Corp.....	,, 22	17.200	17,021	— 179	21	372,115	+ 6,014
Met. Elec. Trys.	,, 21	9.229	8,836	— 393	34	309,749	+ 5,776
Nat. Steam Car Co., Ld.	,, 21	3,593	4,725	+ 1,132	41½	179,764	+ 69,278
Nelson Corporation.....	,, 22	222	189	— 39	20½	4,458	— 62
N'castle-on-Tyne Corp.	,, 22	4,578	4,971	+ 393	21	110,092	+ 9,525
Newport (Mon.) Corp...	,, 22	790	799	+ 9	21	17,951	+ 1,992
New St. Helens & Dist..	,, 19	892	964	+ 72	7	6,997	— 174
Northampton Corp	,, 21	616	504	— 112	20½	12 390	+ 178
Nottingham Corp.	,, 20	3,244	3,225	— 19	20½	72,055	+ 3,481
Oldham Corporation ..	,, 23	2,261	2.232	— 29	22	50,733	+ 2,190
Portsmouth Corp.....	,, 1	2,504	2,925	+ 421	17	42 895	...
Preston Corporation ..	,, 19	880	1,003	+ 123	21	19,471	+ 688
Provincial	,, 22	2,947	2,254	— 693	46	90,439	+ 2,538
Reading Corporation ..	,, 20	742	705	— 37	20	15,162	+ 857
Rhondda.....	,, 13	1,145	1,157	+ 12	32	40,155	+ 1,898
Rochdale Corporation	,, 22	1,666	2,216	+ 550	21	35,363	+ 1,190
Rotherham Corp.....	,, 26	1.074	1,030	— 44	21	21,881	+ 910
Salford Corporation ..	,, 24	5,039	4,670	— 369	19	109.460	— 679
Sheffield Corporation ..	,, 23	7,444	7,412	— 32	21½	169,640	+ 7,637
Southampton Corp.....	,, 19	1,538	1,509	— 29	20	29,024	+ 1,412
Southend-on-Sea Corp.	,, 19	1,170	1,461	+ 291	21	24,401	+ 3,027
South Met. Trys.	,, 21	1,167	1,152	— 15	34	37,484	+ 8,174
South Shields Corp.....	,, 22	819	753	— 66	20½	17,067	+ 1,727
Sunderland Corp.....	,, 23	1.557	1,547	— 10	21	32,879	+ 1,647
Sunderland District ...	,, 19	656	544	— 112	42	24,363	+ 1,837
Swindon Corporation ...	,, 19	189	225	+ 36	20	3,726	+ 335
Torquay	,, 13	1,421	763	— 658	32	18 940	— 294
Trys. (M.E.T.) 'Buses	,, 22	8,364	9,084	+ 720	34	304.754	+ 186,358
TynesideTrys. & Tmrds	,, 19	578	617	+ 39	8	4,378	+ 137
Wallasey Corporation ...	,, 22	1,412	1,445	+ 33	20½	28.666	+ 1,692
Walsall Corporation ...	,, 22	681	629	— 52	34	21,283	+ 366
Walthamstow U.D.C....	,, 22	827	925	+ 98	21	17,951	+ 1,973
Warrington Corp	,, 20	410	419	+ 9	20	9,052	— 97
West Ham Corporation	,, 20	2,662	2 840	+ 178	20	59,084	+ 2,880
Wigan Corporation	,, 20	1,415	1,403	— 12	20	30,693	+ 377
Wolverhampton Corp	,, 26	1,084	970	— 114	22	23,517	+ 75
Yorkshire (W. Riding)	,, 23	1,692	1,438	— 254	34	49,924	+ 749

* From such of the services as were working both last year and this year the receipts show a decrease of £2,045 upon the week.

DICK, KERR & CO.,
Limited,
ABCHURCH YARD, CANNON STREET, LONDON, E.C.
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TRAMWAYS & LIGHT RAILWAYS
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THE

Tramway & Railway World

Vol. XXXVI. No. 12. | LONDON, SATURDAY, SEPTEMBER 5, 1914. | [Established in 1892.

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Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

ELECTRIFICATION OF MELBOURNE SUBURBAN RAILWAYS.

The Agent-General for Victoria, Australia, is prepared to receive tenders for the supply and delivery in Melbourne of :—

Three-Phase Motors for Driving Workshop and other Machinery for use in connection with the Electrification of the Melbourne Suburban Railways now being carried out.

Specification and form of tender may be obtained from Messrs. Merz and McLellan, Consulting Engineers, 32, Victoria Street, Westminster, S.W., on or after Monday, September 7, 1914. Any *bona-fide* tenderer requiring information in addition to that contained in the specification may apply to Messrs. Merz and McLellan.

The charge for the specification in duplicate is £5 5s., and £2 2s. each for any further copies.

Sums paid as above will be refunded on receipt of a *bona-fide* tender for the whole of the works included in the specification.

The cheques which must accompany applications for the specification are to be crossed and made payable to the Agent-General for Victoria.

Sealed tenders, marked "Electrification of Melbourne Suburban Railways—Tenders for Three-phase Motors for Driving Workshops and Other Machinery," are to be addressed to the Agent-General and delivered at his office, Melbourne Place, Strand, W.C., not later than 12 noon on October 12, 1914.

The Government do not bind themselves to accept the lowest or any tender, and ample security will be required from the contractor whose tender is accepted.

SOUTH INDIAN RAILWAY COMPANY, LTD.

The South Indian Railway Company, Limited, are prepared to receive tenders for the supply, after March 31, 1915, of :—

Rolling Stock :—Steel Covered Goods Bogie Wagons, High-sided Bogie Wagons, Bogie Timber Trucks, Bogie Rail Trucks and Brake Vans (Metre Gauge).

Specifications and forms of tender may be obtained at the Company's Offices.

Tenders, addressed to the Chairman and Directors of the South Indian Railway Company, Limited, marked "Tender for Rolling Stock," must be left with the undersigned not later than 1 o'clock on Wednesday, September 23, 1914.

The Company is not bound to accept the lowest or any tender.

A charge, which will not be returned, will be made of 40s. each for the specification.

Copies of the drawings may be obtained on payment at the offices of Robert White, Esq., M.Inst.C.E., Consulting Engineer to the Company, 3, Victoria Street, Westminster, S.W.

By order, V. E. DE BROE, M.Inst.C.E.,
For Managing Director.

Company's Offices,
91, York Street, Westminster, S.W.,
September 1, 1914.

COUNTY BOROUGH COUNCIL OF LIMERICK.

ELECTRICITY DEPARTMENT.

The Limerick Corporation is prepared to receive tenders for :—

One Three-Cylinder Diesel Oil Engine coupled to a 160-kilowatt d.c. Generator.

One Motor-driven Air Compressor.

Specification and form of tender can be obtained from Mr. E. B. Thornhill, A.M.I.E.E., Borough Electrical Engineer, Power House, Frederick Street, Limerick, on payment of £2 2s. deposit, which will be returned on receipt of a *bona-fide* tender.

Delivery, combined plant to be ready for supply of electricity nine months from receipt of order, will be strictly enforced, and the contractor will be expected to put the work in hand subject to the sanction of a loan by the Local Government Board.

The lowest or any tender need not be accepted.

Sealed tenders, endorsed "Tender for Plant, Contract 2," should be delivered at my office not later than 4 o'clock on Friday, September 18, 1914.

WM. M. NOLAN,
Town Hall, Limerick. Town Clerk.

MANCHESTER CORPORATION TRAMWAYS.

The Tramways Committee of the Manchester Corporation are prepared to receive tenders for the following, viz. :—

(a) Beaver, Serge and Pilot Cloths.
(b) Making-up of Uniform Clothing.
(c) Uniform Caps.

Specifications and forms of tender may be obtained on application to Mr. J. M. McElroy, General Manager, Corporation Tramways, 55, Piccadilly, Manchester. Tenders are to be addressed to the Chairman of the Tramways Committee, 55, Piccadilly, Manchester, and must be received not later than 10 a.m. on Tuesday, September 15, 1914.

The Committee do not bind themselves to accept the lowest or any tender.

THOMAS HUDSON,
Town Hall, Manchester, Town Clerk.
August 28, 1914.

WHITBY URBAN DISTRICT COUNCIL.

TO CLIFF TRAMWAY AND LIFT MANUFACTURERS.

The Whitby Urban District Council contemplate the provision of a Cliff Tramway, or a Lift, from the beach to the top of the cliff, and invite schemes, with quotations, for the execution of the work.

The undercliff measures—at probable position of tramway or lift—about 250ft. horizontally, and 130ft. vertically.

Schemes and quotations must reach the Clerk to the Council before September 30, 1914.

The Council do not bind themselves to accept any tender or scheme.

THOS. KEAT SCOTT,
Surveyor.

Offices of U.D. Council, Whitby, Yorks,
August 13, 1914.

POSITIONS VACANT.

BURGH OF AYR.

ELECTRICITY DEPARTMENT.

Wanted, Shift Engineer with experience in A.C. and D.C. plant. Salary 30s., increasing by 5s. per week per annum to 40s. per week.

Applications, stating age, experience, date on which duties can be commenced, and accompanied by copies of three recent testimonials, to be sent to

THE MANAGER,
Electricity Works, Ayr.

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COUNTY BOROUGH OF SWANSEA.

APPOINTMENT OF SWITCHBOARD ATTENDANT.

The Corporation of Swansea invite applications for the appointment of a Junior Switchboard Attendant.

Salary £70 per annum, rising by annual increments of £6 to a maximum of £100 per annum.

Applications endorsed "Switchboard Attendant," stating qualifications and accompanied by copies of not more than three recent testimonials, must be addressed to the Town Clerk, Guildhall, Swansea, and reach him on or before noon on Tuesday, the 22nd instant. Canvassing, directly or indirectly, is strongly objected to, and is strictly prohibited, and any candidate pursuing the practice will be disqualified.

By order, H. LANG COATH,
Town Clerk.

Guildhall, Swansea,
September 1, 1914.

COLOMBO.

Overhead Linesman required for Colombo, competent to carry out repair work to overhead construction, and with general working knowledge of electric tramway practice.

Must be single, under 30 years of age, and physically fit for tropics. Good prospects for suitable men.

Applications, with full particulars of experience and copies of recent testimonials, and stating wages required, to be addressed to—

COLOMBO ELECTRIC TRAMWAYS AND LIGHTING CO., LTD.,
11, St. Bene't Place, Gracechurch Street, London, E.C.

TRAMWAY SUPPLIES, Ltd.,
Tramway Engineers,
Sole Selling Agents for S. Dixon & Sons' Tramway Material,
160, WOODHOUSE LANE, LEEDS.
Sole Manufacturers of
TURNER'S PATENT AUTOMATIC POINT CONTROLLERS.
Telegrams: "Controllers, Leeds." Telephone: 3488 Leeds.
OVERHEAD LINE MATERIAL AND SUPPLIES.

SEND YOUR ENQUIRIES FOR
Insulating Materials,
Brass, Iron, and Copper Stampings, and General Supplies
TO
JOSEPH THOMPSON,
COLUMBIA WORKS, 106, Eyre Street, SHEFFIELD.
Telegrams: "Insulator. Sheffield."
Engineers' Specifications worked to.

THE NATIONAL RELIEF FUND.

(Treasurer H.R.H. The Prince of Wales.)

This great National Fund, for the relief of those amongst the needier classes who are widowed, orphaned and otherwise affected by the fighting in which our troops and ships are now taking part, urgently seeks contributions, however small. These can be sent with the following note, which can be cut out, filled in, put in an envelope and sent unstamped, addressed H.R.H. The Prince of Wales, Buckingham Palace, London.

Date .....

I enclose £ s. d. towards the Prince of Wales'

NATIONAL RELIEF FUND.

Name .....

Address.....

.....

Whenever you are repainting your poles ask for samples of the Kearsley ready-mixed POLE PAINTS as supplied to important Companies at home and abroad. These Paints are durable, retain their colour during exposure, and prevent rust. Information free on request.
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THE SANITARY WOOD PAVING
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BITUMEN CABLES.
TRAMCAR HEATERS.
TRAMCAR METERS.
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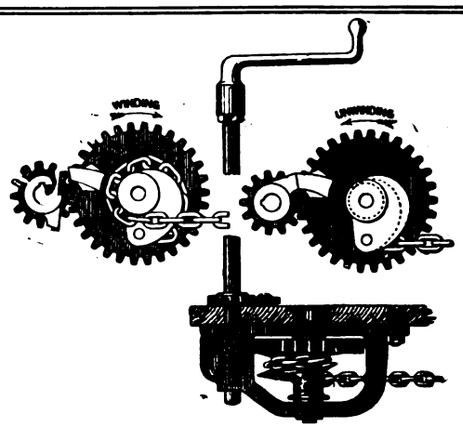

The "Peacock" IMPROVED Brake
(PATENT).
Note the simplicity of the Radial Contact pieces which render this the quickest of all geared hand brakes by
(1) Preventing the drum from over-running on release;
(2) Stopping the drum always at the point from which recovery of chain is most rapid;
(3) Eliminating all idle turning of the handle.
THE "PEACOCK" BRAKE CO., 27, CLEMENTS LANE, LONDON, E.C.

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THE
Tramway AND Railway World

Established in 1892 and Published by

THE TRAMWAY & RAILWAY WORLD PUBLISHING CO., Ltd.,
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One Shilling per Single Copy.

FOR ALL PLACES ABROAD—Thirty Shillings per Annum.

SATURDAY, SEPTEMBER 5, 1914.

THE "OCEAN"
ACCIDENT AND GUARANTEE CORPORATION, LTD.,
IS THE
PREMIER INSURER OF TRAMWAYS
HEAD OFFICE:
MOORGATE STREET, LONDON, E.C.

OMNIBUS WORKING EXPENSES.

A series of interesting figures are now available regarding the working expenses of motor-omnibuses in England during the year ended March last. The undertakings referred to are associated with municipal tramway systems, and are as yet on a small scale. After allowing for capital charges and for depreciation, some of them do not show a profit, but the figures are sufficiently encouraging to warrant extension of an experiment which does not involve a very large capital expenditure. Moreover, it can hardly be doubted that the traffic on the associated tramways has been considerably benefited by the feeding action of the omnibus extensions. The latest and one of the most prosperous examples is that of Sheffield, where the figures for the first complete year of working have just been issued. The favourable financial results must be specially gratifying to Mr. Fearnley, the general manager of the tramways, as he was one of the first tramway managers to point out—now several years ago—that motor-omnibuses might well be worked as extensions and feeders of a tramway system. Sheffield is now working thirteen omnibuses, and six more have just been ordered, as power was recently obtained from Parliament to run the vehicles on additional routes, so as to include all but one of the main outlets from the city. While the receipts for the past financial year amounted to £9,128, the working expenses were only £5,974. Depreciation, calculated on a five years' basis, absorbed a further sum of £1,360. After allowing for this and for capital charges and income-tax, there remains the substantial balance of £1,271, which has been carried to reserve. Of even more interest are the figures per mile run. The revenue was 10.2d., the working expenses 6.675d., interest and sinking fund .482d., income-tax .102d., and depreciation 1.52d., so that the total expenditure was 8.779d., leaving 1.421d. for the reserve fund. These figures are quite comparable with those which are believed to represent the costs per mile run by the London General Omnibus Company, though that body works on such a large scale. A comparison of working expenses with those of three other municipal omnibus undertakings (the reports of which have recently been published in this journal) is useful. Excluding capital charges and depreciation, so as to compare with the Sheffield figure of 6.675d., it is found that in Wolverhampton the cost is 6.795d. In Birmingham the figure is 9.288d., among the items which stand high being petrol, 2.556d.; while Halifax comes out at 9.262d. The details of the items are not stated in the same way in the various cases, and it is possible that some items are included in the Birmingham and Halifax cases which are absent from the others. Another field for comparison of a highly interesting kind will shortly open up when figures become available for the Edison battery omnibuses which are being started in South Shields and Southend. In many quarters great things are hoped for with this form of traction.

TRAMWAYS AND THE WAR.

BOLTON.—Arrangements are in hand for relaying part of the tramway track, and further works are to be instituted with the object of finding employment for a large number of workmen for some time to come.

BRIGHTON.—The Brighton Corporation tramway staff have provided 43 men for active service, either Reservists or Territorials. Most of these men are drivers or conductors. The difficulty from the tramway point of view has been met by putting conductors on as drivers and engaging outside men to act as conductors.

GLASGOW.—The departments of Glasgow Corporation have arranged for their subscriptions to the Prince of Wales' National Relief Fund being continued on a systematic basis. The employees in the tramway department have arranged to give a total of £5,000 during the next six months payable by weekly instalments.

GENERAL ELECTRIC COMPANY.—Up to the beginning of this week nearly ten per cent. of the employees of the General Electric Company had joined the colours. Among them are 75 from the head office, London, including Mr. H. Clifford Palmer, manager of the publication department, who is a lieutenant in the London Scottish.

CARDIFF.—The City Tramways Cycling Club have decided unanimously to abandon a pic-nic, the fund raised for that purpose being voted to the Prince of Wales' Relief Fund. The Tramways Band Committee have unanimously decided that half of the proceeds of their next annual concert shall be devoted to the same fund.

YORK.—Various York Corporation Committees have under consideration schemes for the making of a new road and for building workmen's cottages for tramway employees, etc. At present there is no necessity for starting works for the relief of unemployment, but the Corporation are putting things in train so that if the necessity arises the works may be started without delay.

MANCHESTER.—The Tramways Committee have decided to guarantee half wages to all single men employed by the committee who volunteer for active service. This offer has already been extended to married men, but single men will obtain the concession, even if they have no dependents. Collecting boxes for the National Relief Fund are fitted to the Manchester cars, and considerable sums are being obtained in this way.

HALIFAX.—The Corporation on Wednesday passed the following resolution:—"That all officers and servants in the employment of the Corporation who join, or have joined the Navy, Army, Reserve, or Territorial forces, be granted leave of absence, and that the Corporation provide for the payment to them, or to their representatives or nominees during their absence from civil duty, their full salary or wages, less the deduction of the amount payable by the Government as Navy or Army pay allowances."

THE BRITISH ELECTRICAL FEDERATION has issued a notice to its staff stating that it will assist every eligible man in its employ who enlists for service during the war. A mutual aid fund has been established to assist dependents of men on active service, and this fund will be maintained and supplemented by the Federation so long as the war lasts. Every man who enlists for the war will on his return be reinstated in his present position, or will have suitable employment with the Federation found for him.

EXETER.—The Corporation Tramways Committee are doing everything in their power to induce the tramway employees to enlist. At a meeting of the employees, which was also attended by members of the Corporation, Mr. T. Linscott, chairman of the Tramways Committee, read a resolution passed by an emergency meeting of the committee which set out that every member of the tramway staff who enlisted in the Navy or Army during the exist-

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ence of the war should be reinstated in his former position of employment upon returning to civic life; that his pay upon resumption of such employment be reckoned as if time with the colours were time spent with the tramways department, with the addition of one year; and that the tramway staff be informed that provision would be made by the City Council for the welfare of the dependents of the Council employees who were called to the colours. It was pointed out by Mr. Stocker that the Council was going to raise the Government separation allowance of wives of soldiers on service from 7s. 7d. per week to 12s.; the allowance for eldest children from 1s. 2d. per week to 3s.; and for the other children from 1s. 2d. to 2s. As the result of the meeting, 17 employees signed their names as willing to serve.

FULLY EQUIPPED BATTERY.—Messrs. Docker Brothers, Limited, varnish, japan, and colour manufacturers, of Saltley, Birmingham, have made a very practical and valuable response to the appeals for assistance in the present crisis. They have presented to the War Department (which has accepted with grateful thanks) a fully equipped battery of four heavy guns, comprising the following:—240 men (including N.C.O.'s), 7 mounted officers (including a major, 2 captains, and 4 lieutenants); four 4.7 guns, each with 8 horses; and 30 waggons, each with 4 horses. With the battery goes a full equipment of ammunition, kit, lifting and hauling tackle, scientific instruments, etc., as also a completely equipped ambulance section. The total cost has been over £10,000. The battery as a unit has been invited to volunteer for immediate active service. In addition to this, the number of Reservists employed by the firm will bring the total number of men mobilised to well over 500. The firm has undertaken to provide for the wives, families, and dependents of the whole of these men apart from any outside relief.

RESISTANCE OF STEEL CONDUCTOR RAILS.

The attention which is now being given to the question of the electrification of railways and the number of undertakings in hand and projected, makes the Report of the Engineering Standards Committee on the British Standard Method of Specifying the Resistance of Steel Conductor Rails of special interest at the present time. Dr. R. T. Glazebrook, in the preface, points out that considerable inconvenience has arisen in the past owing to the existence of a certain amount of ambiguity in regard to the methods of specifying the resistance of steel conductor rails, and undoubtedly anything which helps to remove ambiguity from specifications for work or materials must have considerable value, leading to a reduction both in the cost of preparing tenders and in the possibilities of dispute between the contracting parties. The question was brought officially to the notice of the Engineering Standards Committee in March, 1913. It was then suggested that a conference of those interested should be held with a view of endeavouring to arrive at some general agreement as to the method to be employed in the future. This conference was held and the result of the labours of the members, all of whom are prominently associated with railway and tramway work, was submitted to the Sectional Electrical Committee and the Main Committee of the Engineering Standards Committee, and is now issued as Report No. 68.

In the introductory remarks, an explanation is given of the reasons for selecting the particular method which has been adopted of defining the standard dimensions in terms of length and weight per yard, rather than in terms of length and sectional area. Useful tables of reduction factors for converting the resistance of a rail of known weight measured at a given temperature to its value in terms of the standard are given, and in an appendix will be found reduction formulæ, so that previous values for the resistance of rails in terms of copper may be readily reduced in values in terms of the recommended standard. The price of this report is 10s. 8d., post free, and it may be obtained from any bookseller or direct from the offices of the Committee, 28, Victoria Street, Westminster.

MISCELLANEOUS NEWS AND NOTES.

Salford Town Council propose to borrow £12,000 for laying a double line of tramway in Camp Street, Broughton.

Simplex Conduits, Limited, have removed their Liverpool office from 1, Dawson Street, to more extensive premises at 96, Whitechapel.

Edinburgh Corporation Fire Brigade invites tenders for three petrol motor fire engines of not less that 60 h.p., and one petrol lorry of not less than 50 h.p. Tenders must reach the Town Clerk not later than September 9th.

Proposed Mossley Extension.—Stalybridge, Hyde, Mossley and Dukinfield Tramways Board have under consideration a proposal to extend the tramways from Mossley boundary to Greenfield, and to supply Saddleworth with electricity for lighting purposes.

Proposed Tramway at San Juan.—"The Review of the River Plate" reports that the Government of the province of San Juan has approved the plans of the constructing syndicate for a tramway system connecting the city of San Juan with the surrounding suburbs.

Track Maintenance at Maidstone.—At the last monthly meeting of Maidstone Town Council, much discussion took place on a proposal by the Highways Committee that in future the work of maintaining the track should be taken over by that Committee, and that the Tramways Committee should contribute £250 annually towards the cost. Ultimately the matter was referred back to the Highways Committee for an estimate of the amount of the yearly expenses involved.

Railless Traction in South Wales.—The Mountain Ash Council are now considering the question of installing a system of railless traction. They are no doubt moved by the success which has attended the tramways and railless traction lines in the neighbouring district of Aberdare.

A London United Tramway Improvement.—The new tramway line over the widened Kingston bridge has been opened for traffic. The making of the connection of the line with the existing track at both ends of the bridge was carried out with great expedition during the early hours of Sunday morning.

British-made Polack Tyres.—The new factory of the Polack Tyre and Rubber Company at Isleworth is now complete, and machinery of the most up-to-date character has been installed for the manufacture of the Polack tyres, which have for some years past given such excellent results on all types of industrial vehicles.

Through Running at Dublin.—It was reported at the meeting of the Dublin and Blessington Tramway Company, last week, that good results had ensued from the through running arrangement with the Dublin United Tramway Company for goods traffic. Owing to the uneconomic system of traction they did not propose in future running such a large passenger service until electric traction has been adopted.

Motor Omnibus Results at Sheffield.—The Corporation are now working thirteen motor omnibuses, and have ordered six others. The first complete year of the service terminated on March 25th last, and the results appear to be encouraging. The total revenue was 10.20d., and the expenses 8.779d., including depreciation (on a five year basis) of 1.520d. per mile run. The balance of 1.421d. per mile (£1,794) has been carried to a special reserve fund. Petrol cost 1.841d. per mile.

A Liverpool Extension.—A new tramway from Edge Lane terminus to Bowring Park, Liverpool, a distance of 2½ miles, was inspected on Tuesday by Colonel von Donop, of the Board of Trade. For some distance, where the road is very wide, the tramway is given an exclusive right of way and grass has been sown between the rails. References were made at the last conference of the Tramways and Light Railways Association to the construction of this line, and these were reported in our issue of August 13.

Light Railway Orders.—The Board of Trade have confirmed the following orders made by the Light Railway Commissioners:—Swansea Corporation Light Railways (Extension) Order, 1914, authorising the construction by the Corporation of Swansea of further light railways in that borough; North Devon and Cornwall Junction Light Railway Order, 1914, authorising the construction of a light railway in the County of Devon from Torrington to Halwill, including the reconstruction of part of the mineral line known as the Torrington and Marland Railway.

Carriage of Goods on Tramways.—The Mersey Docks and Harbour Board have forwarded to Liverpool Tramways and Electric Power and Lighting Committee their reply to the views advanced by a deputation from the committee which waited upon them in regard to the suggested use of the tramways for the transportation of merchandise. The Board state that in their opinion the scheme would, for various reasons, be impracticable, but that they would be inclined to favour a scheme for facilitating the conveyance of goods from the docks to inland centres by means of motor wagons.

Evasion of Fares.—It seems remarkable, in view of the smallness of the sums involved, that so many attempts should be made to travel on tramcars without paying the fare. Temptation in this direction appears to be greater in those places where season or contract tickets for the tramways are issued. In the latter part of August a man was fined 20s. and costs, or 28 days' imprisonment, at Blackpool Police Court for attempting to avoid payment of a tramway fare. It appeared that he pretended to the conductor that he had a contract ticket, and when asked to produce it he was unable to do so. He also gave a false address.

Chair of Railroading in Harvard University.—A plan having for its object the endowment of a professorship of railroading in the graduate school of business administration of Harvard University is near consummation. The sum of £20,000 has been pledged. The total amount required is £25,000, though it is proposed to raise additional funds to the amount of £50,000 for instruction in railroading. The chair will be named in honour of James J. Hill. The plan is said to have been started by Howard Elliott, chairman of the New York, New Haven and Hartford; Robert Bacon, former ambassador to France, and Thomas W. Lamont, a New York banker.

The Railway Track Supply Company, 80, Gracechurch Street, E.C., inform us that they are carrying on business as usual, with no reduction of staff, and that they have not raised the price of the "Vaughan" rail anchor, although the cost of raw materials has considerably increased. They are content for the present, during the progress of the European war, with a very small margin of profit as long as they can keep their staff fully employed. Prompt deliveries can be given for any number of "Vaughan" rail anchors; the higher rates of freight as at present prevailing should not act as a hindrance to those railways placing orders now who require rail anchors, seeing that the weight of this article is very small. 20,000 "Vaughan" rail anchors will only weigh about 18 tons, and the extra cost per rail anchor therefore is very small, and does not average more than 2½ per cent. increase on the delivered price. Users should bear this in mind. The "Vaughan" rail anchor is British made.

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The "Save All" Life Guard.—An accident happened in Birmingham on Saturday evening last, though happily without fatal results, when a boy was riding his bicycle along Bristol Road and the wheel skidded and threw him and his machine on to the track in front of a passing car. The driver, Samuel Shaw, promptly applied the brakes and stopped the car in its own length. The guard acted perfectly, and picked up both the lad and his machine. The boy crawled from under the car, and was uninjured, with the exception of a slight bruise, and was able to wheel his machine home. The guard was the "Save All," and the boy, Edward Gabriel, is the son of Mr. Gabriel, of Gabriel and Company, Birmingham, the patentees of the guard. This is only one of the numerous instances where life has been saved, and in no case has the guard failed when brought into action.

CONTRACTS AND ORDERS.

St. Helens Cable and Rubber Company have received an order from Warrington electricity and tramways committee for cables, at £1,657.

The British Insulated and Helsby Cables, Limited, have received an order from Edinburgh, in substitution of an order recently placed with a German firm.

Bradford Cancels German Contract.—The Electricity Committee of Bradford Corporation on Tuesday cancelled the contract for a 5,000 k.w. turbo-generator which was being manufactured by the Bergmann Elektricitats-Werke A. G., Berlin, and decided to transfer the order to the British Westinghouse Electric and Manufacturing Company. The amount of the original tender was £9,370.

PERSONAL.

Mr. C. Koettgen has tendered his resignation as a director and managing director of Siemens Brothers Dynamo Works Company. His resignation has been accepted, and Mr. Koettgen has no further connection with the company.

Mr. E. E. Sharp has joined the board of the Jackson Electric Stove Company, Limited, 3, Blandford Street, W., and will act with Mr. Williams in the direction of the business. It will not affect his connection with Messrs. Chamberlain and Hookham's meters and Venner's time switch business.

Mr. W. Vincent Edwards has been appointed engineer and general manager of the Hastings and District Electric Tramways Company, Ltd., as from September 1. He has for some months past been in charge of the system as deputy manager, during the illness of Mr. Thomas B. Holliday. Mr. Edwards was one of the first to join the electric traction branch of Messrs. Dick, Kerr and Company, and saw a good deal of service with them in various English and Continental towns. Subsequently he was in their London office for several years before moving down to the Hastings Company, of which he is now manager.

We regret to record the death, at the age of 66 years, of Mr. Frederick Smith, which occurred at Swinford Old Manor, Ashford, Kent. Mr. Smith was managing director of Messrs. Frederick Smith and Company, Ltd., wire manufacturers, of Halifax and Manchester. He was also a director of the London Electric Wire Company.

FINANCIAL REPORTS AND MEETINGS.

Buenos Ayres Port and City Tramways.—The directors have decided that the coupon of the extension first mortgage debentures, due September 1, cannot be paid.

Alabama Traction Company.—The directors of the Alabama Traction Company announce that, although prior to the outbreak of hostilities arrangements had been made to pay the interest due on September 1st on the 5 per cent. first mortgage bonds, they find themselves obliged, in existing circumstances, to defer payment of interest.

Aberdeen Suburban Tramway Company.—At the half-yearly meeting on August 31, Mr. James Mearns, who presided, moved the adoption of the report, which recommended a dividend at the rate of 2½ per cent. per annum. He said that the company continued to make satisfactory progress, and they were finding some advantage in the price of the electric power which they got from the Town Council. The depreciation fund amounted to the substantial sum of £14,000, being nearly one-half of the paid-up capital of the company. The motor 'buses acquired by the company had justified their existence, and proved substantial feeders to the tramway system. The report was unanimously adopted.

Newcastle Corporation Tramways.—Alderman J. H. Rogers presented the accounts of Newcastle Corporation Tramways for the year ended March 31 last at a meeting of the Tramways Committee on August 27. It appeared that the total receipts were £261,200, being an increase of £22,996 as compared with the previous year. The working expenses amounted to £147,552, an increase of £18,533. The gross surplus was £113,648, against £109,184. After deducting interest, income tax, sinking fund and £12,000 paid as a bonus to the rates, a balance remains of £25,134, which was carried to the reserve and renewals account, which would now stand at £94,338, or £6,000 lower than was considered necessary. It was hoped that this would be put right during the current year. At the beginning of the past financial year this fund stood at £119,407. Out of it £50,204 had been spent on renewals, principally to the track.

Puebla Tramway, Light, and Power Company.—The net profits in Mexico for the year 1913 amounted to $730,952 (Mex.), as compared with $753,635 for 1912 and $655,641 for 1911. Reckoning the earnings at the parity of exchange, there is a balance, after meeting all expenses, bond interest, and first mortgage bond sinking fund, of £1,106, but, owing to the heavy loss in exchange, which amounted to £19,456, the net result is a debit balance of £18,350, which amount has been carried to the balance-sheet. The construction of the power plant at Tuxpango is now completed, and 17,000 h.p. is now available therefrom.

Sheffield Corporation Tramways.—The report for the year ended March 25th last shows that the total income from the tramways was £389,676. The working expenses were £232,761, equal to 6.288d. per car mile, an increase of .112d. compared with the previous year, chiefly accounted for by an increase in the cost of coal, permanent way repairs, and rates. The net revenue was £156,915, and, after deducting interest, sinking fund, income tax, etc., and adding interest on investments, there is a net credit balance of £77,607. Out of this sum £30,123 goes to renewals fund, £7,669 to street improvements, £2,000 to special purpose fund, and £7,234 to accumulated surplus fund; the remaining amount of £30,582 is transferred to the general district rate. The expenditure on renewals of permanent way was £25,255. The number of car miles run was 8,883,576, and the number of passengers was 104,851408, compared with 96,330,242 in the previous year.

National Electric Construction Company.—At the meeting of this company on August 20, Mr. L. B. Schlesinger, who presided, said that the war had interrupted negotiations which had been going on for an important contract for an electric railway on the Continent. In connection with other negotiations for electric lighting and tramway undertakings in Baghdad, a Turkish company had been formed and estimates were being prepared in Baghdad. The company's undertakings in England were moving in the right direction. The Torquay tramways had paid 5 per cent., as compared with 3 per cent. in the previous year, and were showing increased receipts until the war broke out, when the increase was turned into a decrease. At Oxford they had secured the exclusive right to motor 'buses. The Rhondda tramways showed increased income. A special meeting was also held to reduce the capital from £250,000 in £1 shares to £125,000 in shares of 10s. by cancelling capital unrepresented by available assets to the extent of 10s. per share. The chairman said that various causes had contributed to this loss, including large amounts spent in free wiring and the advent of the metallic filament lamp. They considered, however, that the future was promising, and the reduction of capital would enable profits fairly earned to be distributed as dividend instead of going to pay off past losses.

Wigan Corporation Tramways.—In his report for the year ended March 31, 1914, Mr. F. Buckley, traffic manager, states that the results were the most successful in the history of the undertaking. The receipts amounted to £77,973, an increase of £6,704. The profit was £4,690, an increase of £3,511. Although good trade has had considerable bearing on the results, there has been a general all-round improvement in the working. Mr. Buckley alludes to the growth in receipts as an indication of what can be done in the way of promoting traffic by a careful study of somewhat exceptional circumstances. As a result of improvements in the punctual running of cars and the adaptation of services to the requirements of the public, the popularity of the tramway system has much increased. The receipts per car mile averaged 12.46d., an increase of .66d. The average total working expenses per car mile were 7.11, and the percentage of working expenses to receipts stands at 56.07. The receipts from parcels have increased, and the revenue from special cars amounted to over £49. The energy consumed during the year was 1.476 compared with 1.471 units per car mile. During the year the Council granted an increase in pay to employees and reduced the hours of working from 65 to 60 per week. The Corporation has now 67 cars, and its tramway system comprises 45 miles of track.

A Wise Decision at Great Yarmouth.—For the year 1913-14 the tramway undertaking produced a gross profit of £8,631, as compared with £7,801 in the previous year. The net profit was £1,815, and adding the amount already in the appropriation account the available balance was £2,312. A proposal to grant a 1d. in the £ in relief of the rates was lost in committee by the casting vote of the chairman (Alderman Campling), and it was resolved to transfer £1,500 to the general renewal fund. When the accounts were presented to the Council, an amendment was moved by Councillor Rivett in favour of devoting a sufficient sum to relieve the rates by a 1d. in the £. He complained that in 12 years only £1,400 had been handed over to the rates. Councillor Middleton remarked that when it was proposed a company should manage the undertaking the Council were promised a rental of £1,400 a year. Alderman Arnold, a past chairman of the committee, said that if the Corporation had accepted the offer of a company, it would have cost the town considerably more than it received in rent. The tramways helped the electricity undertaking. The reserve fund must be made larger before any profits were distributed. Alderman Campling also took the latter view, and added that the first loan for permanent way was granted for 40 years, and the second for 30 years, while for cars periods of 40 and 15 years were allowed. How was the difference between 40 and 15 years to be met? With the present £1,500 they would have £10,500 in hand, and in ten years' time they would have to find another £15,000. They needed £1,500 a year to meet this. They ought to have not less than £25,000 reserve before reducing the rates. The motion for relieving the rates was defeated by a majority of seven.

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WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 60 of the principal undertakings of the United Kingdom for the week ended August 29 give total receipts of £232,243, or £6,521 less than in the corresponding week last year. The total length of track was 2,863 miles, or 24 more than for the corresponding week. Receipts were at the rate of £81 2s. 4d. per track mile, a decrease of £2 19s. 8d., as compared with the corresponding week of last year.

THE BRITISH ELECTRICAL FEDERATION.

The traffic statement for the week ended August 29, 1914, shows that the receipts from tramways and railways amounted to £40,516, as compared with £43,085 in the corresponding week last year, and from omnibuses £16,547, as compared with £12,856, making a total of £57,063, as compared with £55,941. The tramway and railway route mileage was 429.82, as compared with 428.47. Upon such of the services as were working both last year and this year the receipts show a decrease of £2,999 upon the week.

THE STOCK AND SHARE MARKET.

Extension of the general moratorium until October 4 has met with approval. It was, in fact, inevitable. The Stock Exchange is, in the meantime, ascertaining the extent of the commitments of its members with a view to working out some plan for re-opening the House, at least for cash transactions, but it is improbable that anything will be done in that direction for some time. Dealings have become still smaller than last week. Some tramway shares and bonds appear to be saleable on occasions to a limited extent. Some of the prices mentioned, which, of course, would be subject to negotiation are appended:—

	Bid July 30.	Price bid
Anglo-Argentine 4 per cent. Debentures	90	85
Anglo-Argentine 4½ per cent. Debentures	97	92
Bombay Second Debentures	99	94
Brit. Columbia Elec. Rly. 4½ per cent. Debentures	95	90
Calcutta Tramways 4½ per cent. Debentures	98	92
Mexico Trams First Bonds	62	75
Para Elec. Railway 5 per cent. Debentures	88	84
Sao Paulo Trams 5 per cent. Debentures	98	92
Utd. El. Trams of Monte Video 5 per cent.	95	90

In general, it is satisfactory to find that the public is not anxious to sell. Consols are quoted at 68⅜ ex div.

METAL AND COAL MARKETS.

Owing to the war and the consequent dislocation of the markets no quotations for copper and aluminium or coal are available. The last quoted copper and aluminium prices were given in our issue of July 25, and coal prices in our issue of August 1.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Anglo-Argentine	Aug. 26	£50,368	£49,000	34	£1,369,506	— £15,006
Auckland..... (28 days)	July 31	18,960	20,782	4½	23,311	+ 1,244
Ballarat and Bendigo	June 21	3,178	3,158	12	11,240	+ 95
Brazilian St. Rly. Mlrs.	May	44,920	50,237	43	523,872	+ 76,626
Brazilian Traction.....	July 25	95,720	97,133	4	388,200	+ 8,334
Brisbane	July	26,205	29,680	31	198,655	+ 21,447
British Columbia .....$	July	755,943	690,023	4	690,023	+ 65,920
Buenos Aires Pt. & City	May	6,925	6,713	22	36,517	+ 3,206
Buenos Aires Lacrose...	July	45,221	43,327	4	43,327	— 1,894
Calcutta.....Rs.	Aug. 29	63,712	65,217	34	23,53,388	+ 1,29,982
Cape Town	June	11,560	12,742	52	155,466	+ 18,249
Carthagena & Herrerias	August	2,192	2,758	35	18,970	— 4,347
Cordoba	July	13,629	14,256	17	56,238	+ 2,542
East India	July	1,892	1,966	48	21,030	+ 809
Kalgoorlie.....	June	2,854	2,692	26	15,522	— 1,704
La Plata.....	July	4,770	4,359	30	33,608	— 2,739
Lima.....	June	31,210	33,310	26	207,160	+ 9,021
Lisbon ..... Mlrs.	June	176,170	169,811	26	971,885	+ 39,374
Madras (14 days) Rs.	Aug. 31	28,084	29,529	33	465,638	+ 35,433
Manila.....	June	133,500	132,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	357,500	+ 7,000
Mexico .....$	July	610,602	628,206	31	4,158,751	+ 283,609
Montevideo.....	August	28,829	26,075	43	309,738	— 6,698
Para	July	33,686	20,169	35	170,592	— 34,012
Port Elizabeth.....	June	3,268	3,212	52	44,931	+ 1,901
Puebla .. .. $	June	61,300	52,000	26	380,800	+ 25,900
Rangoon	June	4,807	4,997	28	32,381	+ 982
Shanghai .....$	July 29	31,163	24,600	30	720,340	+ 94,215
Singapore .....$	July 25	12,486	11,520	29	356,905	+ 5,622
Toronto .....$	July	811,966	866,231	31	5,892,147	+ 424,695
Winnipeg..... .....$	July	336,821	846,630	31	2,438 132	+ 128,987

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913-	1914.	Incr. or Dec.	Aggregate. Wks.	1913-4.	Increase or Dec.
Aberdeen Corporation..	Aug. 26	£1,922	£1,626	— £296	13	£23,492	+ £1,181
Accrington Corp.....	,, 26	547	486	— 61	21	12,651	+ 335
Ayr Corporation	,, 29	504	440	— 64	15	7,767	— 90
Bath Electric	,, 12	1,615	1,026	— 589	32	31,786	+ 1,787
Birkenhead Corp.	,, 30	1,370	1,229	— 141	21½	28,125	— 585
Birmingham Corp.	,, 29	11,580	11,094	— 486	23	269,587	+ 19,327
Blackburn Corporation	,, 26	1,279	1,295	+ 16	22	30,965	+ 1,798
Blackpool Corporation	,, 27	3,494	2,417	— 1,077	22	47,955	— 2,320
Bolton Corporation	,, 30	2,778	2,689	— 89	22	62,616	+ 2,241
Bournemouth Corp.....	Sept. 2	2,846	2 248	— 598	22	50,324	— 766
Bradford Corporation..	Aug. 29	6,017	6,019	+ 2	22	141,399	+ 9,178
Brighton Corporation..	,, 30	1,486	1,312	— 174	21½	27,035	+ 863
Bristol	,, 28	8,921	8,638	— 283	34½	298,144	+ 20,094
British Elec. Federatn.	,, 28	55,941	57,063	*	...	...	...
Burnley Corporation ..	,, 29	1,661	1,308	— 353	22	36,684	— 1,160
Burton-on-Trent Corp.	,, 30	312	298	— 14	22	6,784	+ 307
Bury Corporation.....	,, 30	1,411	1,541	+ 130	22	31,573	+ 1,326
Cardiff Corporation.....	,, 8	3,530	3,371	— 159	18	54.870	+ 2,580
Chatham and District..	,, 27	1,099	1,061	— 38	34	31,946	+ 420
Chesterfield Corp.	,, 20	266	263	— 3	19	5,848	+ 471
Colne Corporation	,, 29	302	229	— 73	...	...	...
Cork Electric.....	,, 27	530	506	— 24	34	17,276	+ 140
Croydon Corporation ..	,, 21	1,693	1,727	+ 34	20	37,369	+ 2,377
Darlington Corporation	,, 22	240	262	+ 22	21	5,608	+ 359
Derby Corporation	,, 29	1,070	988	— 82	21½	23,057	+ 1,148
Dover Corporation	,, 22	403	270	— 133	21	5,511	+ 23
Dublin & Lucan	,, 28	165	154	— 11	8½	1,471	— 163
Dublin United	,, 28	5,362	6,078	+ 716	34	208,048	— 4,230
Dundee City	,, 26	1,381	1,283	— 98	14½	19,883	+ 252
East Ham Corporation	,, 29	966	1,218	+ 252	21½	24,297	+ 2,546
Exeter Corporation	,, 28	412	368	— 44	22	8,162	+ 293
Gearless Motor 'Buses.	,, 29	605	575	— 30	35	16.406	+ 6,735
Glasgow Corporation ..	,, 29	20,269	19,774	— 495	12	262,115	+ 10,099
Glossop (U. Elec. Supply)	,, 29	134	125	— 9	35	4,481	— 80
Halifax Corporation ..	,, 25	2.217	2.389	+ 172	21	49,825	+ 3,237
Hastings & District.....	,, 26	1.896	1.235	— 661	34	33,957	— 1,202
Huddersfield Corp.	,, 29	2,141	2.185	+ 44	22	72,419	+ 5,561
Hull Corporation	,, 29	3,024	2,922	— 102	23	68,885	+ 1,914
Ilford U.D.C.	,, 29	443	615	+ 166	21	12,302	+ 2,267
Ilkeston Corporation ..	Sept. 2	139	133	— 6	22	3,009	— 31
Ipswich Corporation ..	Aug. 29	609	494	— 115	22	10,957	+ 351
Isle of Thanet	,, 29	1,988	1.256	— 732	47	29,456	— 2,006
Kilmarnock Corp.	,, 29	206	153	— 53	15	2,687	— 159
Lanarkshire	,, 27	1,800	1,848	+ 48	34	64,938	+ 7,976
Lancashire United	,, 26	1,570	1,673	+ 103	34	56,672	+ 5,062
Leeds City	,, 29	8,285	7,860	— 425	22	186,874	+ 5,510
Leicester Corporation..	,, 29	2,876	2,689	— 187	35	100,795	+ 4,287
Leith Corporation	,, 29	736	708	— 33	15	11,882	+ 516
Leyton U.D.C.	,, 27	1,348	1,431	+ 83	20	29,490	+ 1,721
Liverpool Corporation..	,, 29	13,103	13,048	— 55	34½	458,033	+ 13,220
Llandudno & Colwyn B.	,, 28	768	521	— 247	39	12,295	— 1,355
London County Council	,, 26	40,289	42,575	+ 2,286	21	935,224	+ 46,652
London Gnl. Omnibus..	,, 1	68,575	71,625	+ 3,050	31	1,982,031	+ 64,894
London United	,, 28	7,046	6,369	— 677	35	218,432	— 1,379
Lowestoft Corporation	,, 29	517	310	— 207	47	10,318	+ 312
Maidstone Corporation	,, 27	223	228	+ 5	22	4,898	+ 298
Manchester Corp.....	,, 29	17.214	16,042	— 1,172	23	388,157	+ 4,986
Met. Elec. Trys.	,, 28	9.060	8,766	— 294	35	318,516	+ 5,483
Nat. Steam Car Co., Ld.	,, 31	4,808	6,720	+ 1,912	43	186.484	+ 71,190
Nelson Corporation.....	,, 29	236	189	— 47	21½	4,648	— 109
N'castle-on-Tyne Corp.	,, 29	4,812	5,282	+ 470	22	116,374	+ 10,995
Newport (Mon.) Corp...	,, 29	829	808	— 21	22	18,759	+ 1,971
New St. Helens & Dist..	,, 26	838	1,108	+ 270	8	8,105	+ 89
Northampton Corp	,, 28	595	522	— 73	21½	12,912	+ 105
Nottingham Corp.	,, 27	3,296	3,236	— 60	21¼	75,298	+ 3,423
Oldham Corporation ..	,, 30	2,508	2.244	— 264	23	52,977	+ 1,926
Portsmouth Corp.....	,, 29	2,968	2,648	+ 320	22	56 816	...
Preston Corporation ..	,, 26	875	889	+ 5	22	20,351	+ 694
Provincial	,, 29	2,654	2,261	— 393	47	92,700	+ 2,128
Reading Corporation ..	,, 27	742	700	— 42	21	15.862	+ 815
Rhondda.....	,, 27	1,212	1,210	+ 18	30	42,547	+ 1,988
Rochdale Corporation	,, 29	1,691	1,828	+ 137	23	37,191	+ 1,327
Rotherham Corp.....	Sept. 2	1,016	1,008	— 8	22	22,889	+ 902
Salford Corporation ..	Aug. 31	5,268	4,696	— 572	21	114 043	— 2,018
Sheffield Corporation..	,, 30	7,412	7,230	— 182	23½	176,871	+ 7,438
Southampton Corp.....	,, 26	1,516	1,404	— 112	21	30,428	+ 1,300
Southend-on-Sea Corp	,, 26	1,673	1,467	— 206	22	25,868	+ 2,821
South Met. Trys.	,, 28	1,201	1,132	— 69	35	38,616	+ 8,105
South Shields Corp.....	,, 29	829	751	— 78	21½	17,817	+ 1,649
Sunderland Corp.....	,, 30	1,586	1,474	— 112	22	34,353	+ 1,534
Sunderland District ..	,, 26	628	524	— 104	43	25.388	+ 1,783
Swindon Corporation ..	,, 26	193	188	— 5	21	3 914	+ 324
Torquay	,, 27	1,507	674	— 833	34	20 288	— 1,781
Trys. (M.E.T.) 'Buses	,, 29	8,613	8,896	+ 283	35	313,649	+ 186,640
TynesideTrys. & Tmrds	,, 26	596	691	+ 95	9	5,069	+ 232
Wallasey Corporation ..	,, 29	1,374	1,350	— 24	21½	30 016	— 1,668
Walsall Corporation ..	,, 29	696	599	— 97	35	21,882	+ 978
Walthamstow U.D.C...	,, 29	794	859	+ 65	22	18,810	+ 2,038
Warrington Corp	,, 20	410	419	+ 9	20	9,052	— 97
West Ham Corporation	,, 27	2,691	2,798	+ 107	21	61,883	+ 2,987
Wigan Corporation	,, 27	1,460	1,382	— 78	21	32,080	+ 299
Wolverhampton Corp	Sept. 2	1,100	975	— 125	23	24,492	— 50
Yorkshire (W. Riding)	Aug. 30	1,508	1,422	— 86	35	51,845	+ 662

* From such of the services as were working both last year and this year the receipts show a decrease of £2,999 upon the week.

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THE Tramway & Railway World
WITH MOTOR TRAFFIC SECTION

FOUNDED 1892. LONDON, SEPTEMBER 10, 1914. VOL. XXXVI.

SALFORD CORPORATION TRAMWAYS.

The chairman of the Salford Corporation Tramways Committee is the president of the Municipal Tramways Association for the current year, and the Association in ordinary circumstances would have held its annual meeting in September at the home of its president. In the present lamentable condition of Europe the Association has, however, felt it unsuitable to meet in the usual conference, and, as announced elsewhere in this issue, the Council has cancelled the arrangements. In the meantime, as a preliminary to the visit of municipal representatives to the thriving industrial borough of Salford, arrangements had been made, with the courteous assistance of Mr. G. W. Holford, the general manager of the tramway undertaking, to publish in this issue an account of the system and its equipment. Inasmuch as members will not now have the opportunity of inspecting the undertaking, there is the greater cause for the publication of the article, which, with the accompanying illustrations, describes some of the notable features in a tramway system of which the citizens of Salford have a right to be proud.

Cross Lane Junction—Salford Corporation Tramways.

One of the Largest Junctions in the United Kingdom with Curves in all Four Corners.

Salford is a Parliamentary and municipal borough in south-east Lancashire, 188 miles from London and 31 from Liverpool. It is a market town, chapelry, poor law union, and large manufacturing town having communication with London by the Midland, Great Northern, and North Western Railways; by branch lines with Sheffield, Liverpool, Chester, and other

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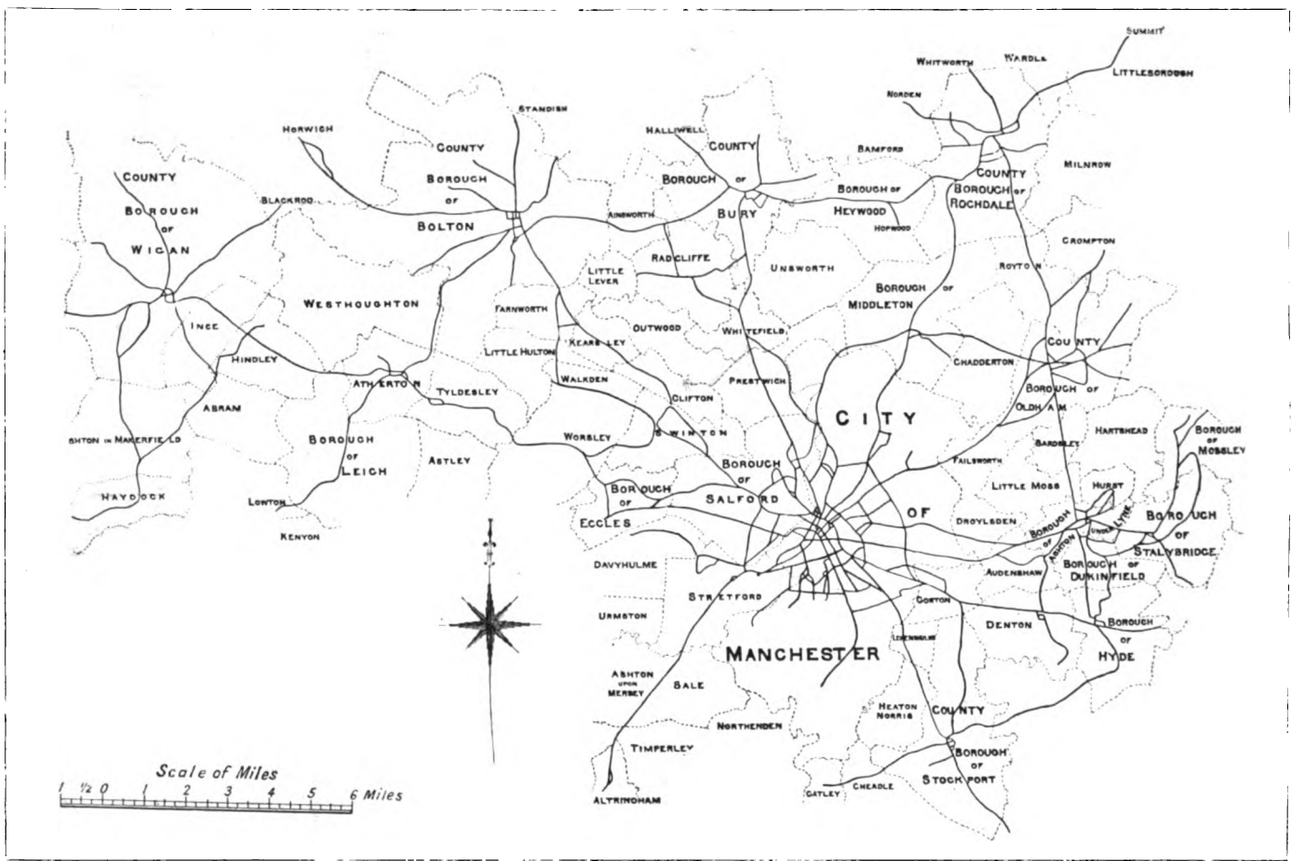
places; and by the River Irwell, on which it is situated, and by the Bridgewater and Bury and Bolton Canals with many parts of the kingdom.

The history of Salford is coeval with that of Manchester; a considerable portion of the older parts of the borough is occupied by mills and factories for spinning and weaving cotton and other textile fabrics, iron works, brass works, tool makers, dye works, etc. Along with other manufacturing towns it suffered severely from the cotton famine. The borough was enfranchised by the Reform Act of 1832, and then sent one member to Parliament. The representation was increased to two by the Act of 1867, and in 1885 it was accorded three members by the Redistribution of Seats Act. The charter of incorporation was obtained in 1884 and by an Act passed in 1889 a separate Court of Quarter Sessions was granted to the borough.

Whilst the inner portions of the town are of a busy manufacturing kind, the outer fringe contains many places of a picturesque character, and on the northern side are the residences of many of the merchant princes of the adjoining city. The principal docks of the Manchester Ship Canal are situated in the borough, and the Bishop and the Dean of Manchester both reside within the borough. The Corporation possess several parks, including Peel Park, Buile Hill Park, Albert Park, etc., the total area of the parks and recreation grounds amounting to 283 acres. The area of the municipal borough is 5,282 acres; the population at the last census (1911) was 231,357.

Five sets of public baths have been erected within the borough, and numerous libraries and reading rooms. The Corporation are the owners of a cattle market, which is frequently referred to as the second largest in the country. The water supply is obtained from the Manchester Corporation. The gas works, tramway undertaking, and electricity works, are owned by the Corporation.



Plan of Tramways in Salford, Manchester, and Neighbouring Boroughs and Districts.

THE TRAMWAYS.

The tramways originally formed part of a horse-car system worked by the Manchester Carriage and Tramways Company, Limited. In the year 1901, the leases having expired, the Corporation took over the tramways and commenced to equip them electrically, and a length of the line so converted was opened in that year. This work was fully described and illustrated in our issue of December 6, 1901. The length of line operated by the Company at that time comprised about 30 miles.

Since then further portions of the system have been opened, and the total length now operated by the Corporation measures 75·8 miles of single track, for the maintenance, etc., of about 56 miles of which they are responsible. In addition to those within the borough, the Corporation also operate the tramways in the adjoining borough of Eccles and in the urban districts of Swinton, Pendlebury, Prestwich, and Whitefield; they have running powers over a portion of the lines in the adjoining city of Manchester and over a short portion of the South Lancashire tramway system at Worsley; and they operate (jointly with the Manchester Corporation) the lines owned by the Trafford Park Estates Company, Limited, which were formerly worked by that company.

The accompanying map shows how important a link the Salford system forms with that of many other Lancashire towns, as it is possible to travel by car from Manchester, through Salford, to Liverpool with a break of only a few yards. It follows, necessarily, that the Corporation must be deeply interested in any scheme of transit of goods by tramways between the docks of the Manchester Ship Canal, the principal of which are situated in the county borough of Salford, and the many busy manufacturing towns in the south and east Lancashire areas.

The undertaking has made remarkable progess since its inception, as the following figures will show. When

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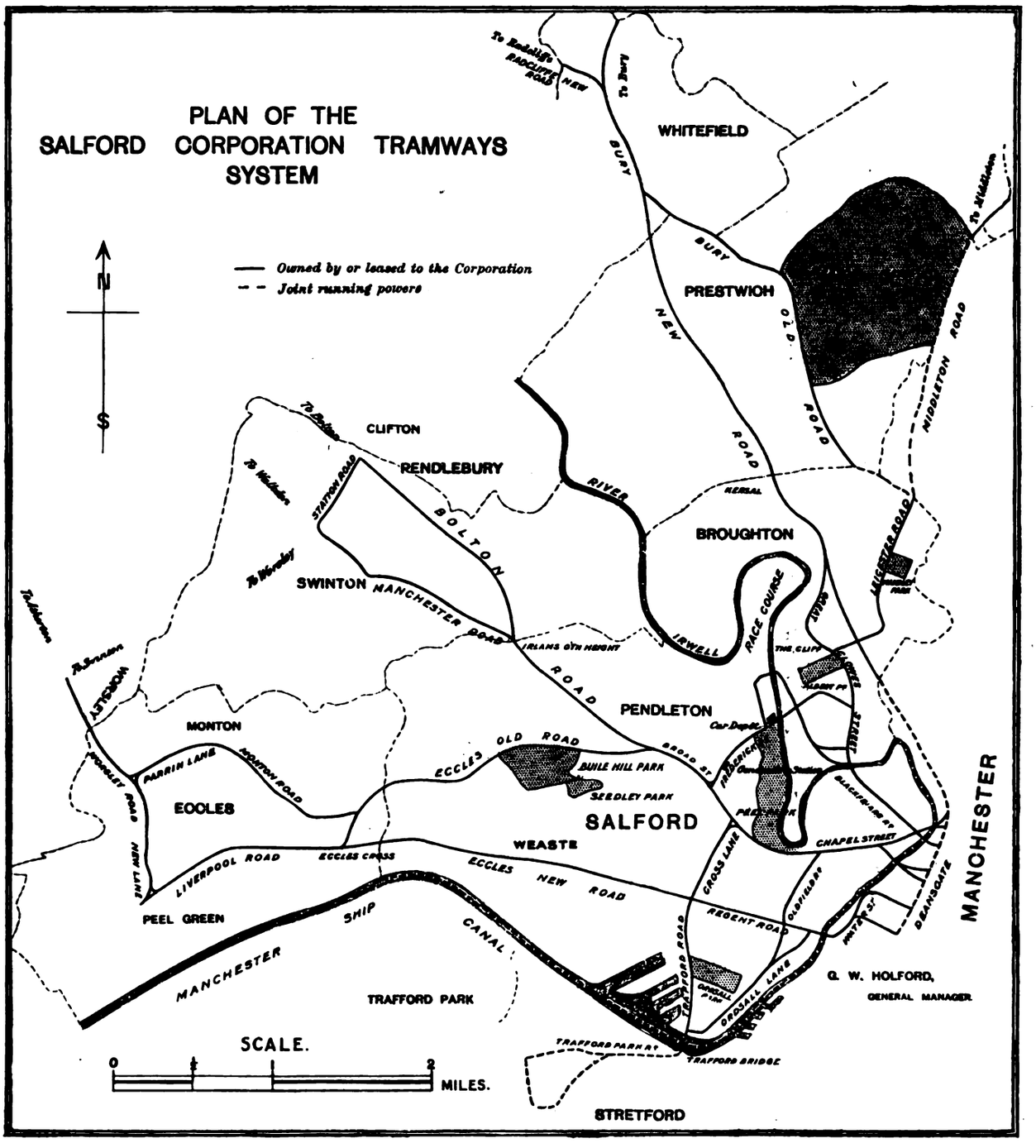
the lines were owned by the company the approximate annual income was £90,000; the income of the undertaking for the year ended March 31, 1914, amounted to £273,567. The Corporation have contributed the sum of £193,750 in relief of rates, and they have also paid into the depreciation and renewals fund nearly £95,000 since the commencement.

Extensive renewals have been carried out to date, and about 15 miles of single track have been relaid, while some six miles, where the joints were in fairly good condition, have been welded by the "Tudor" process. The committee have carried out many improvements in the several branches of the undertaking, and, wherever it has been shown to have been of benefit to the Corporation, such alterations have been made without hesitation; at the same time, they have always rigidly opposed two proposals, namely, the adoption of halfpenny fares and the display of advertisements on the cars.

The committee have been extremely fortunate in the fact that they have had the services of Mr. Alderman Linsley as chairman from the commencement; indeed, very few changes have been made in the personnel of the committee itself. It will be understood that with a tramway system operating in the districts of several authorities numerous agreements have had to be made dealing with the rentals and other payments. In the Manchester area the principle underlying the arrangement is that the Corporation of Salford shall not retain any profit made in that area. With regard to the Eccles tramways, the Corporation pay a rental of 10 per cent. on the capital cost to the Eccles Corporation; in addition they also pay the interest and sinking fund charges of certain street improvements.



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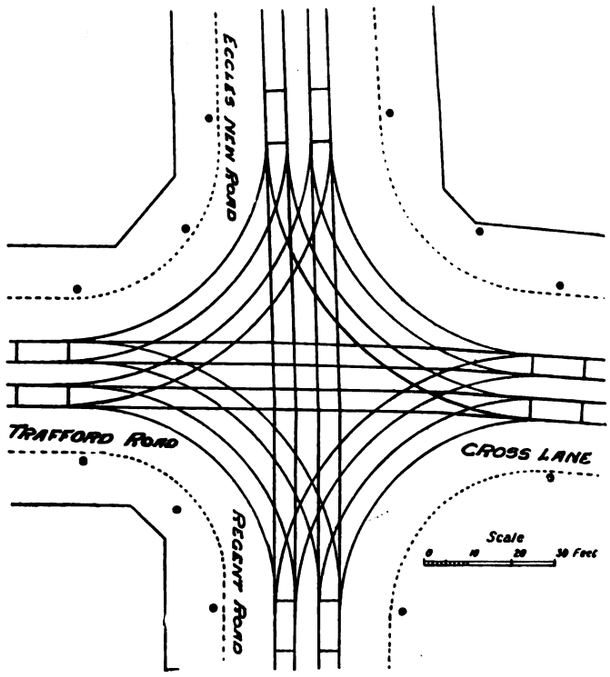
In the Swinton and Pendlebury districts and in the Whitefield area the Corporation pay off the capital cost of the tramways during the term of the lease; while in the Prestwich area they also pay to the Prestwich Urban District Council one-third of the profits made upon such tramways. In the Trafford Park area and on the South Lancashire Company's system the Salford Corporation are only allowed to retain their working expenses.

A small portion of the Salford system is operated by the Bury Corporation, for which they pay to Salford an agreed figure representing the profit made by them over such lines.

PERMANENT WAY.

The permanent way is under the charge of the general manager, and is maintained in first-class condition. The Corporation have, however, experienced considerable trouble owing to rail corrugations, as have many other municipal authorities. These have appeared under different conditions, and to a varying extent. They have been eliminated by means of grinding blocks of the "Bulldog" brand, which are fitted to the truck



Plan of Junction at Cross Lane, Salford.

(A Photograph of this Junction is given on page 183.)

of the watering car. The water in the tank is used to keep the rails clean and cool whilst the blocks are travelling over them.

When the permanent way was first laid down the rails weighed 102 lb. per yard, and were 60 ft. long, but on all new and renewal work the B.S.S. No. 4 rail, modified and known as B.S.S. No. 48, is adopted throughout. On all new curved work the B.S.S. No. 4 C rail has been adopted. Together with the 15 miles of single track relaid, the special work of most of the important junctions, etc., has been renewed, together with the points and crossings in all single track within the borough. In all new or renewal work the rails have been welded by the "Thermit" process with satisfactory results. Most of the rails used on the Salford system have been supplied by Walter Scott, Limited, of Leeds; the major portion of the special trackwork by Messrs. Hadfields, of Sheffield; and a small portion by Messrs. Askham Brothers, of Sheffield. The standard length of points used is 15 ft., and all new points and crossings are of solid manganese. The system comprises many important junctions, and we give a plan of one of the largest in the country, known as Cross Lane Junction. This was relaid two years ago without a stoppage of traffic, and is, practically, solid manganese throughout.

OVERHEAD EQUIPMENT.

In the early years of the tramway undertaking an arrangement of centre poles was largely adopted, but after several years' experience it was decided to take them up and to substitute side poles, except in one main thoroughfare where the street is exceptionally wide. Span-wire construction and side poles with bracket-arm construction are used on various portions. The whole of the poles have been supplied by Messrs. James Russell and Sons, Wednesbury. With regard to the trolley wire, experiments have been made from time to time with almost every variety, but it has been found that the round 0·4 trolley wire has given the best results. At a large number of junctions automatic point controllers have been fixed, these being mainly of the "Collins" type, supplied by Messrs. Quilliam Brothers, of Salford. On several lengths of single line signalling apparatus is used, and has given very satisfactory results.

ROLLING STOCK.

The 200 cars in use, all double deck, are of various types, and several modifications and improvements have been introduced from time to time in the last 13 years. At present there are 83 single truck, 2-motor equipment, uncovered, and 56 with upper deck covered; 23 bogie truck, 4-motor equipment, uncovered, 20 with upper deck covered, and seven 2-motor equipment, uncovered; 10 vestibule-ended, uncovered, on single trucks, and one on bogie trucks. The Corporation formerly had a "combination" type of car on bogie trucks, 2-motor equipment, but these were found unsatisfactory for service, and have been discarded. Further additions are contemplated to the rolling stock, and tenders are under consideration for the supply of 12 double-deck bogie-truck cars, 2-motor equipment, without outer covers, and 12 with outer covers. These cars will have vestibuled ends. The cars are thoroughly overhauled, painted, and re-varnished at regular intervals.

The cars are fitted with "Peacock" brakes, which are much appreciated by the motormen. They are also equipped with the "Cummins" magnetic sanding apparatus, which operates automatically in conjunction with the electric brake, and practically on the whole of the cars "Barrett" controller regulators have been attached to the controllers. The sanding gear in use is principally that of the "Taylor" type of Liverpool. Cast-iron brake shoes are used, as well as those of the National Rail Company's type, of Liverpool. Steel tires are fitted throughout, and their average life is about 70,000 miles. The size of the axles varies in accordance with the type and weight of the cars. Part of the rolling stock was obtained from the United Electric Car Company, of Preston, part from Hurst, Nelson, and Company, Motherwell, and part from the Brush Engineering Company, the remainder being from firms who are not now in existence. In addition to the tramcars, the department also possesses a miscellaneous stock of other vehicles, comprising two motor tower wagons, a motor lorry, two motor cars, a horse-drawn tower wagon, four salt wagons, a watering car, horses, etc.

DEPOT, CAR SHEDS, SUB-OFFICES, ETC.

The whole of the service is operated from the central car depot, of which a full description appeared in our issue of September 6, 1907. From time to time extensions have had to be made, and a further extension

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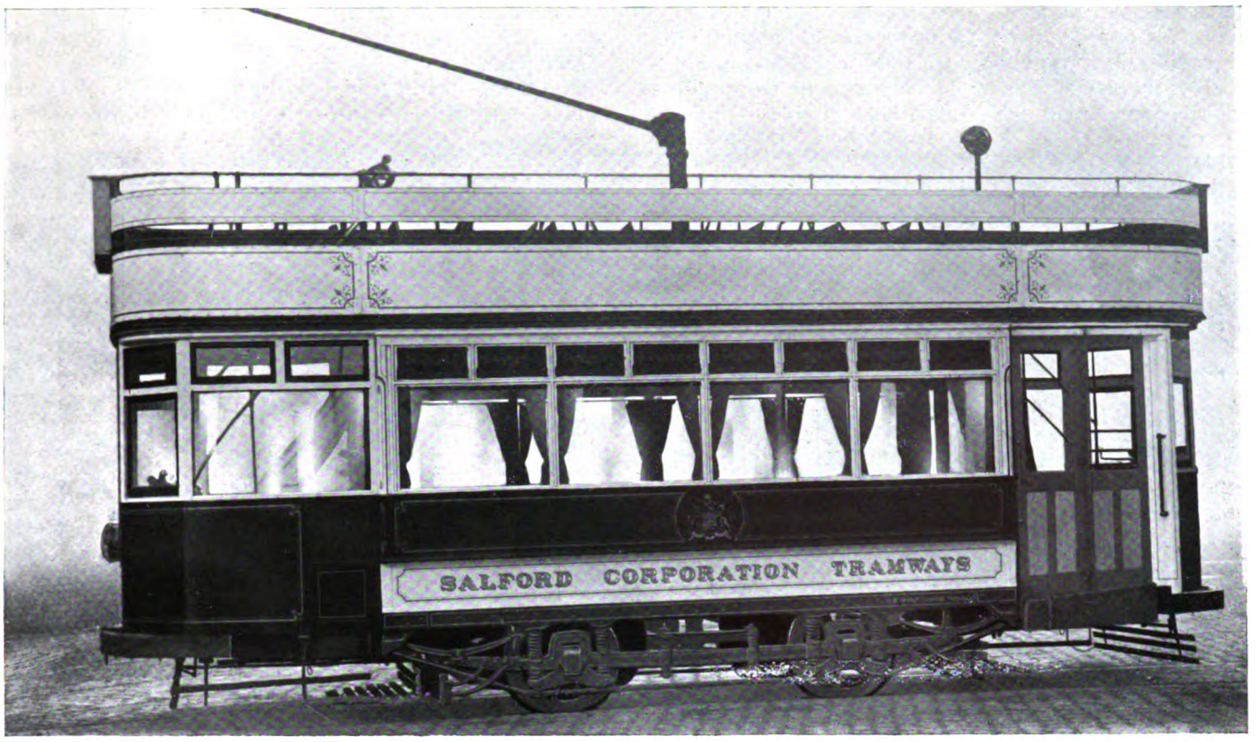
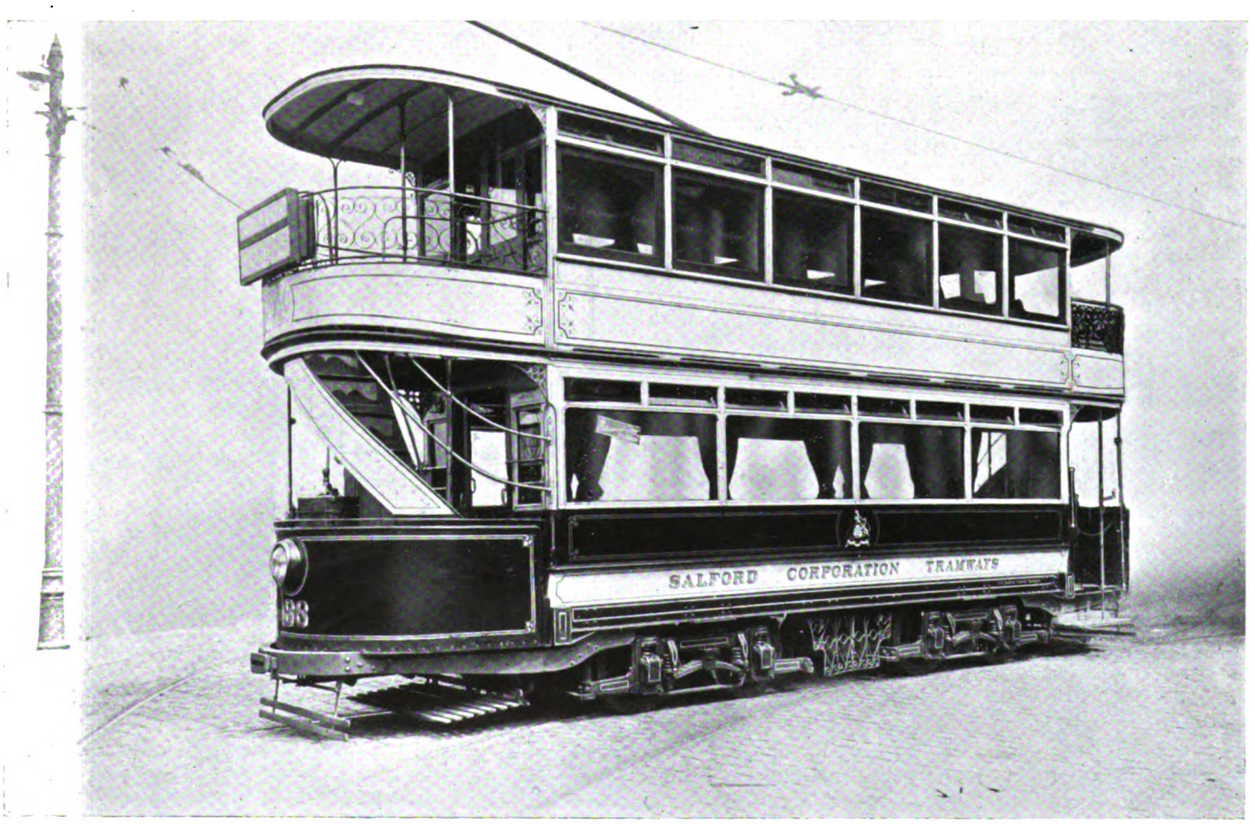


Latest Type of Single-Truck Car with Vestibules.



Latest Type of Double-Deck Top-Covered Bogie Car.

CARS OF SALFORD CORPORATION TRAMWAYS.

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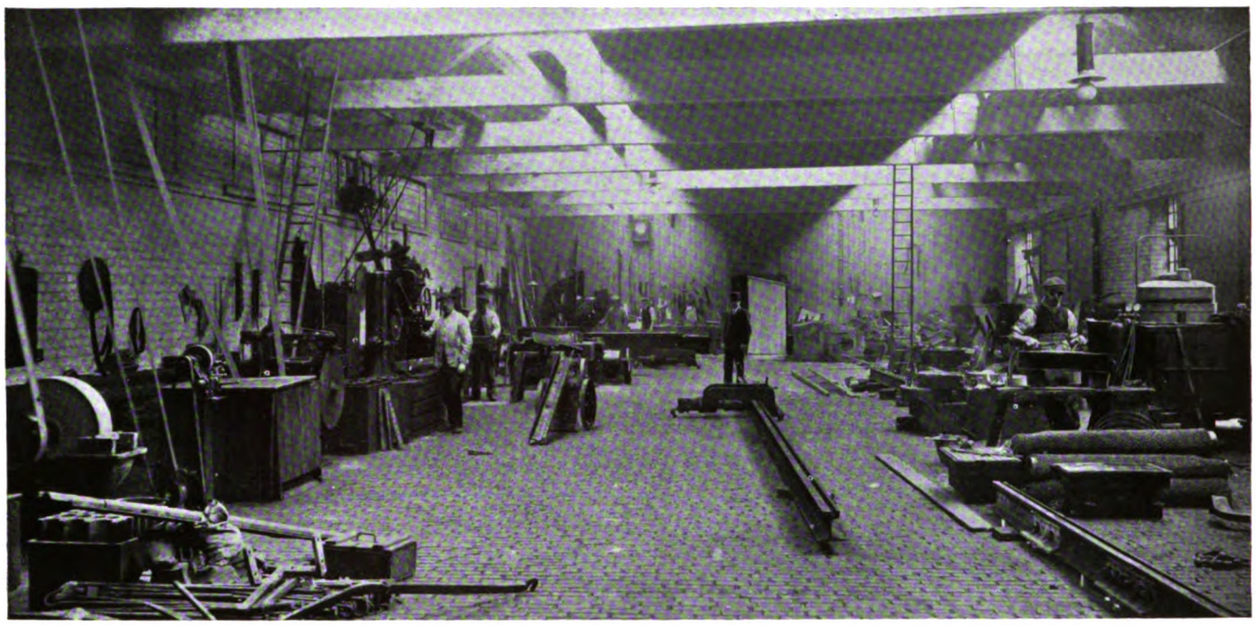
is now in contemplation. The whole of the stores and workshops are heated by hot air and all the car sheds proper by steam during the winter months. The several workshops are fully equipped with the latest type of machinery. In the rear of the car depot are the permanent way workshops, and the building mess rooms, day rooms, recreation rooms, a large hall, etc., are also in this building. In addition to these premises the Corporation occupy a large building in Blackfriars Street, bordering on the boundary with Manchester, as general offices; the whole of the cars on the system pass within a few yards of these offices.



Interior of Permanent Way Workshops.

up of all new trackwork and the renewal of crossings, etc., are carried out here. The sand-drying apparatus used is that of the "Robinson" type, and has given very satisfactory results; the sand is mainly that from the Mersey beds. In the front of the car depot are the offices of the depot superintendent and his staff; and also those of the traffic men who are responsible for the turning out of cars, etc., and for the overhead equipment; The Corporation are also owners, and, in some cases, tenants of a number of sub-offices, and they have various waiting rooms, etc., on the system.

Trafford Bridge Sub-Office and Waiting Room—Salford Corporation Tramways.

ADMINISTRATION.

The whole of the undertaking is under the administration of the general manager, Mr. G. W. Holford, who has occupied his present position for nine years. He was formerly chief assistant to his predecessor, Mr.

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E. Hatton, now general manager of the Newcastle tramways. The general manager is assisted by a staff comprising traffic, permanent way, rolling stock, and overhead equipment superintendents, with their several subordinate officers. Each head of a department is responsible to the general manager for the proper carrying out of his own duties, and for the conduct of those under him. The committee have on many occasions testified to the efficient manner in which the duties of these several officials have been carried out.

TRAFFIC DEPARTMENT.

The traffic department is operated from the head offices in Blackfriars Street, under the control of the superintendent, Mr. W. Blakemore. Two chief inspectors divide between them the duty of superintending the outdoor work, and there is under them a large body of inspectors, who have to be competent to undertake temporary car repairs, ticket inspection, and other duties. Candidates for driving have to pass a medical examination before being trained for duty.

The present pay schedule is as follows:

	Motormen. d. per hour.	*Conductors.* d. per hour.
On appointment	6·22	6·22
After 1 year's service	6·69	6·44
„ 2 „ „	7·19	6·94
„ 3 „ „	7·44	7·19
„ 4 „ „	7·55	7·33

General Offices—Salford Corporation Tramways.

Trolley Boys.	Per day. s.	d.
On appointment at 15 years of age	1	4
At the end of 1 year's service	1	8
„ „ 2 „ „	2	0
„ „ 3 „ „	2	4
„ „ 4 „ „	2	8

Overtime.—Time and a quarter paid for all time worked over 9 hours each day. Time and a half paid for all time worked over 11 hours each day.

Sundays.—Halfpenny per hour extra paid to motormen and conductors on all the above rates for all time worked on Sundays.

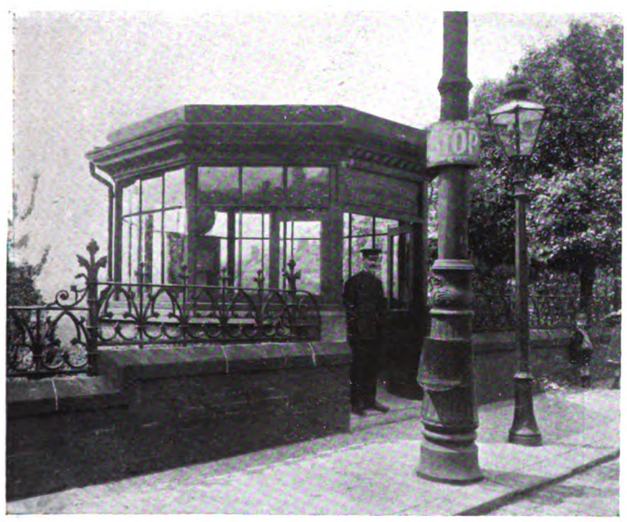
Holidays.—Seven days' leave with pay per annum.

TICKETS.

The ticket department is situated at the head office, and naturally many classes of tickets are used on this system. Very few privilege tickets have been introduced; of special interest being those only given to the blind people resident in the borough. Trials have been made, from time to time, of advancing the hour during which early morning fares could be charged, and of issuing weekly contract tickets: but in both cases the results have been detrimental to the undertaking and they have been discontinued. The present arrangement is that early morning tickets can be taken out by any passenger travelling on the cars up to 7 a.m., and, if desired, a return ticket can be obtained available during any hour of the same day.

MEN'S ASSOCIATION, ETC.

The employees have formed amongst themselves an excellent social and athletic society, the membership of which is approximately 700. They possess a full military band, which gives performances in the public parks ever year, and is employed on various other public occasions. Most successful sports are held



Albert Park Tramway Shelter, Salford.

Park Lane Tramway Shelter, Salford.

Junior Conductors (promoted from Trolley Boys).	d. per hour.
On appointment at age of 19 years	5·00
At age of 20 years	5·50
„ 21 „	6·22

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annually, certain of the events being confined to members; many others are open events, and the meetings have been most successful and highly appreciated. The Tramways Committee have placed at the disposal of the society suitable rooms at the central car depot, comprising billiard, reading, and lecture rooms, etc. During the winter months whist drives for employees and their friends are held weekly, at which there is an average attendance of 300. Cricket, football, swimming, bowling, and fishing clubs are formed amongst the members of the society.

Alderman E. Desquesnes,
Mayor of Salford.

ELECTRICAL ENERGY.

The electrical energy used on the tramways within the borough and in a portion of the out-districts is supplied from the Salford Electricity Station, the price paid therefor being 1·3d. per unit, with a reduction of ·3d. for all units consumed over seven millions. The plant at the power-station originally consisted of eight sets of Browett-Lindley engines and Mather and Platt dynamos, with 16 boilers of the Galloway type, but the electricity department are now substituting as quickly as possible turbo-generators of greater capacity, and it is hoped in the near future that they will be able to supply the tramways department with current at a much cheaper rate. For the electrical energy taken from the Manchester Corporation the price of 1·026d. per unit is charged; for that supplied by Eccles 1·125d. for the first 675,000 units and ·75d. for those beyond, with certain conditions as to the varying prices of coal, while for that supplied by Bury Corporation 1d. per unit is charged. The tramways department do not own the cables between the electricity station and the trolley line, and the energy is metered at the generating station switchboards.

TRAMWAYS COMMITTEE.

The Tramways Committee of the Corporation is composed of the following members:

Alderman H. Linsley, J.P. (chairman).
Councillor W. H. Barrett, J.P. (deputy-chairman).
The Mayor (Alderman Desquesnes, LL.B.).
Alderman Hulton.
" Jackson, J.P.
" Jenkins, J.P.
" Worsley, J.P.
Councillor Barker.
" Billington.
" Burnley, J.P.
" Campion.
" Hailwood, J.P.
" Hopwood.
" Littler.
" Mather, J.P.

RESULTS OF THE LAST FINANCIAL YEAR.

The report of the general manager for the year ended March 25 last gives, among others, the following details.

Councillor W. H. Barrett, J.P.
Deputy Chairman, Salford Tramways Committee.

Alderman H. Linsley, J.P.,
Chairman, Salford Tramways Committee.

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R. Chadwick,
Depot and Rolling Stock Superintendent.

H. Richardson,
Permanent Way Superintendent.

H. Weston,
Overhead Equipment Superintendent.

W. Billington,
Chief Clerk, General Staff.

G. W. Holford,
General Manager.

J. W. Blakemore,
Traffic Superintendent.

E. R. Leather,
Chief Clerk, Accounts Staff.

C. F. Ellwood,
Chief Traffic Clerk.

C. F. Elwood,
Chief Clerk, Traffic Staff.

OFFICIAL STAFF OF SALFORD CORPORATION TRAMWAYS.

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SALFORD CORPORATION TRAMWAYS—SUMMARY OF FINANCIAL RESULTS, 1904-1914.

Year	1904-5.	1905-6.	1906-7.	1907-8.	1908-9.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.
	Mls. fur. chns. 70 6 0	Mls. fur. chns 74 6 0	Mls. fur. chns. 74 6 0	Mls. fur. chns. 75 0 0	Mls. fur. chns. 75 0 0	Mls. fur. chns. 75 0 0	Mls. fur. chns. 75 0 0	Mls. fur. chns. 75 0 0	Mls. fur. chns. 75 6 4	Mls. fur. chns. 75 6 4
Lines open (single track) miles										
Total capital expenditure	£638,332	£657,564	£670,739	£689,385	£715,881	£719,348	£721,337	£723,324	£723,672	£723,923
Loans outstanding	£595,008	£620,652	£626,609	£633,686	£638,068	£631,520	£607,867	£581,149	£536,791	£532,821
Loans repaid and sinking funds	£41,000	£69,521	£125,701	£98,764	£97,933	£99,860	£98,975	£140,555	£168,115	£190,883
Renewals and reserve funds	£21,137	£30,439	£46,146	£58,307	£57,819	£57,453	£46,744	£48,964	£43,699	£28,493
Total receipts	£209,672	£223,908	£232,551	£239,563	£237,978	£238,258	£242,862	£254,032	£260,851	£272,812
Working expenses	£134,892	£144,194	£142,166	£147,286	£154,967	£152,002	£155,585	£156,219	£161,084	£178,770
Net surplus	£13,000	£13,000	£13,000	£18,000	£17,000	£17,000	£18,750	£18,000	£22,000	£22,000
Appropriation of net surplus to relief of rates	£13,000	£13,000	£13,000	£18,000	£17,000	£17,000	£18,750	£18,000	£22,000	£22,000
Average total receipts per car-mile	10·29d.	10·221d.	10·594d.	10·484d.	9·872d.	10·125d.	10·007d.	10·497d.	10·692d.	10·501d.
Percentage of operating expenses to total revenue	64%	64·6%	59·9%	60%	65%	64%	64%	62%	62%	65%
Energy consumption per car-mile (units)	1·41	1·48	1·53	1·58	1·62	1·63	1·66	1·58	1·60	1·606
Car-mileage	4,884,590	5,257,223	5,268,933	5,486,150	5,785,469	5,647,428	5,824,474	5,808,369	5,854,830	6,235,278
Passengers carried	39,213,560	41,807,539	43,614,123	45,771,611	45,975,584	45,940,775	46,659,553	48,720,788	50,113,120	53,124,546
Traffic revenue per mile of single track	£2,963	£2,984	£3,102	£3,185	£3,164	£3,166	£3,228	£3,377	£3,425	£3,646
Operating expenses per passenger	·83d.	·834.	·782d.	·77d.	·81d.	·794d	·80d.	·76d.	·77d	·81d
Average number of cars in use daily	117	122	125	131	138	137	140	140	144	158
Aver. working expenses per car-mile(ex.power cost)	4·51d.	4·36d.	4·418d.	4·47d.	4·398d.	4·464d.	4·436d.	4·506d.	4·661d.	4·945d.
Aver. working expenses per car-mile(in.power cost)	6·62d.	6·584d.	6·476d.	6·44d.	6·428d.	6·459d	6·411d	6·455d.	6·603d	6·881d.
Average fare paid per passenger	1·28d.	1·28d.	1·27d.	1·25d.	1·24d.	1·24d.	1·24d.	1·30d.	1·243d.	1·227d.
Total number of units used	6,927,805	7,784,292	7,983,603	8,575,859	9,258,774	9,094,699	9,301,713	9,137,678	9,260,898	9,812,392

The total length of tramways worked by the Corporation was 75¾ miles, made up as follows:

Salford	36·75 miles,	owned by Corporation.
Manchester	8·5 „	running powers by agreement.
Eccles	8 „	leased to Corporation.
Swinton and Pendlebury	6·75 „	„ „
Prestwich	8 „	„ „
Whitefield	4·5 „	„ „
Trafford Park	2·5 „	worked jointly with the Manchester Corporation.
Worsley	0·8 „	running powers by agreement.

The total electrical energy used during the year for haulage, lighting of cars, etc., amounted to 9,812,392 units. Of this, 7,921,725 units was supplied by Salford Corporation electricity works, and the balance by four other authorities. The car-mileage run amounted to 6,165,258 miles, giving an average consumption of 1·606 units per car-mile, an increase of ·006 units per car-mile against the previous year. (In this calculation the car-mileage run in Trafford Park is excluded, as the current is provided by the company, and the cost of the same is not included in the operating expenses retained by the Corporation out of the income from the lines.)

The stock of cars at the end of the year was 200, including 83 double-deck, single-truck cars; 56 with outer-deck covers; 20 double-deck, bogie truck, with outer-deck covers (4-motor equipment); and 23 double-deck, bogie truck, and a few others. The majority of the cars have been equipped with meters for recording the current consumption, and this has resulted in much economy being exercised by the motormen. Approximately a total of 13¾ miles of the permanent way have now been relaid, and in nearly all the work rails of the Sandberg specification (which it is anticipated will give a longer life than the rails previously used) have been adopted, and the joints welded by the Thermit process.

The year's working resulted in a gross profit of £94,041 18s. 1d., to which must be added the sum of £5,044 2s. 8d., for interest on investments, etc., making a total available balance of £99,086 0s. 9d., and this has been dealt with as follows: Payments to local authorities for running powers, etc., £28,789; interest and sinking fund charges, £42,621; repairs, etc., to property, Church Street, £109; contribution in relief of rates, £22,000; depreciation and renewals fund, £4,450; covered tops for bogie cars, £673; heating car sheds, £441.

In addition to the above item of £4,450 2s. 7d. as contribution to the depreciation and renewals fund, the amount of interest accrued during the year by the fund itself amounted to £847 9s. 10d., and by the sale of old rails a further sum of £884 7s. 7d. was realised, making a total addition to this fund of £6,182.

Although the total receipts exceeded those of the previous year, considerable additional expenditure has occurred, particularly in regard to the wages paid to the various employees, and in respect of an important rating appeal, the decision being adverse to the Corporation.

A summary of the financial position in each of the past 10 years, 1904 to 1914, is given in the adjacent column. During this period the total receipts have increased from £209,682 to £272,812. Total receipts per car-mile in 1905 were 10·29d.; for the past year they were 10·50d. The working expenses have increased from £134,892 to £178,770, the present ratio being 65 per cent.; and the net surplus has increased from £13,000 to £22,000. The total number of passengers carried is now 53,124,546, an increase of 13,911,000 since the first year of working.

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MONOPHASE TRAMWAYS OF SAINT ANDRÉ AND CUBZAC.

By the courtesy of the French Thomson-Houston Company we are enabled to give some particulars and illustrations of the plant and rolling stock supplied by them to MM. Ortal and Lagueyte, of Bordeaux, for the equipment on the monophase system of their tramways from Libourne to Saint André, and from Libourne to Puisseguin. The conditions which had to be met in designing these lines are briefly as follows: Numerous curves of short radius, narrow and sometimes crowded village streets, routes, as in Libourne, traversing important centres, steep gradients, especially at Puisseguin, where there are inclines of 55 in 1,000 and a difference of altitude of 275 ft., and low bridges which give considerably less than the height usually required. Moreover, the service is subject to great variations, due to the special traffic in the agricultural district served, to the crowding of people on market days, and to the heavy passenger and goods traffic at the time of the grape harvest. Besides, this, the lines pass close to large building stone quarries. The traffic from this source is of a special nature, and the materials are often difficult of transport on tracks which run sometimes along the roadway and sometimes on the roadside. Finally, the district has an especially damp climate; certain sections of the roads followed are covered at high tides by sea water coming from the estuary of the Dordogne, while in summer the temperature is sometimes very high.

The rolling stock comprises goods motors, passenger motor cars, and numerous trailer cars which can be attached to either type of motor. Owing to the metre gauge it was difficult to design the cars so as to meet all the requirements, but to do this as far as possible they have been designed with one first-class compartment seating seven passengers, two second-class compartments providing seats for 28 passengers, a central platform with standing places for 15, one luggage compartment, and a platform at either end of the car for the motorman. There are also the necessary boxes required for the postal service. The motor cars are equipped with motors sufficiently powerful to draw several trailer cars.

Electrical energy is obtained from the hydro-electrical station of the South Western Power Company at Tuilières and is supplied in the form of three-phase current with a frequency of 50 periods. The three-phase current is converted into monophase at 16·6 periods.

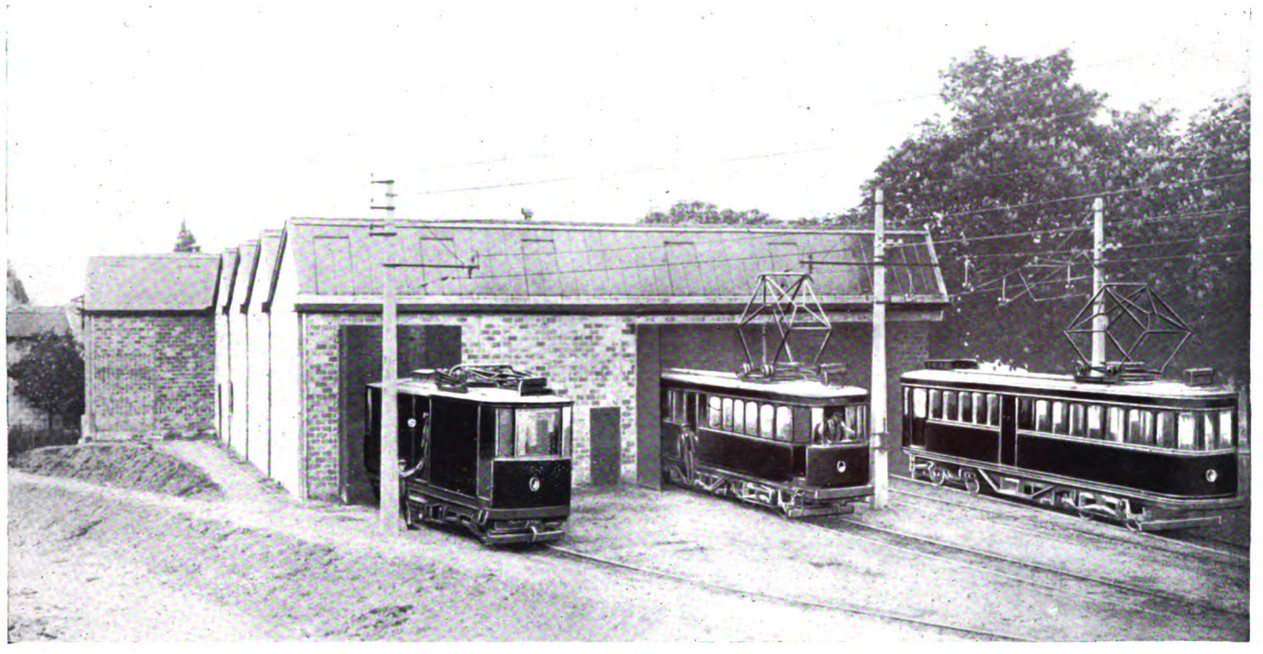

Fig. 1.—Cars, Depot, and Sub-Station at Libourne.

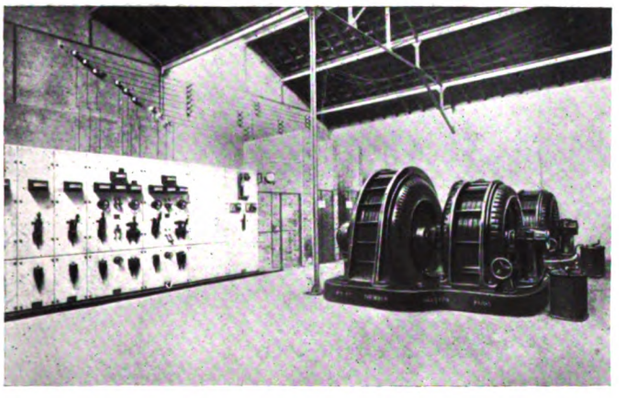

Fig. 2.—Interior of Sub-Station at Libourne.

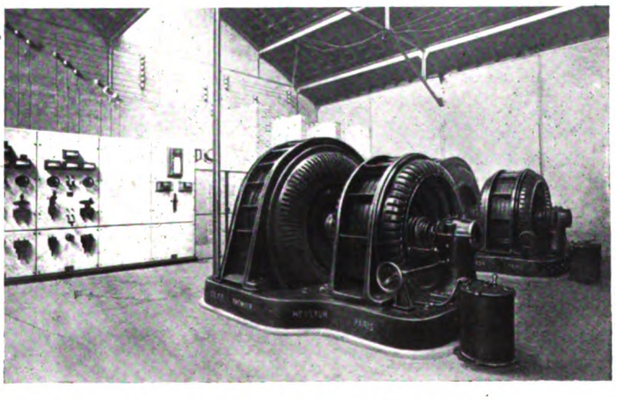

Fig. 3.—Another View in Sub-Station.

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This current is supplied to the trolley lines at 6,600 volts from a sub-station of 350 K.V.A. capacity situated

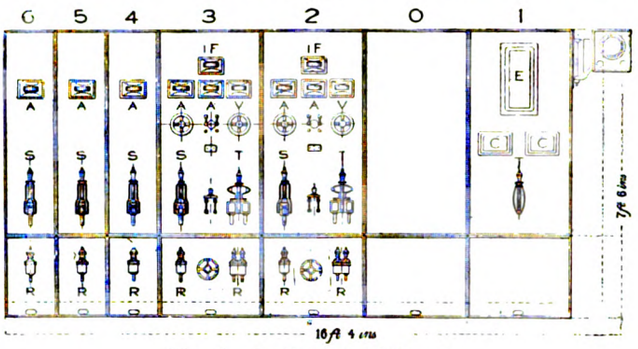

Fig. 4.—Switchboard Panels.

at Libourne in the car depot illustrated in Fig. 1. The three-phase system which serves the sub-station is fed from the main station at Tuilières at 13,200 volts and 50 periods. The installation includes, as is shown in Figs. 2, 3, and 5, two groups which convert the three-phase current into monophase. Each group is composed of a step-down transformer and a motor generator. Each three-phase transformer is oil insulated and air cooled, and has a capacity of 220 K.V.A., with star connections to the primary and to the secondary. The three-phase motor of each group is of the asynchronous type, with a rotating armature and a starting rheostat in oil tank with regulator. Each is capable of giving 250 H.P., and is operated at 50 periods at a pressure of 440 volts between phases. The monophase alternator is of 220 K.V.A., or 175 KW. (since the power factor is 0·80), wound for a pressure of 6,600 volts at the terminals and a frequency of 16·6 periods, and a continuous-current exciting dynamo of 110 volts on the same shaft. The shafts of the motor and alternator are rigidly coupled and rest upon the same bed plate.

The switchboard is divided into six panels, the arrangement of which will be seen in Fig. 4. These are as follows: (1) Main panels, (2 and 3) group panels, (4, 5, and 6) feeder panels, and a panel has been provided for a third group. Each of these include a base and an upper part of white marble with bevelled edges on which are mounted the usual instruments.

The energy is registered before its transformation by a recording watt meter fed from current transformers. Two induction meters are besides connected to the same transformers. These are four in number; two are current transformers (Fig. 4) with the ratio 60:5, while the other two are potential transformers of ratio 6600:110. They are all placed on the main panel.

Both groups can work at a continual load of 220 K.V.A. with a power factor of 0·80 keeping the temperature of the motor or of the alternator less than 45 deg. C. above that of the surrounding air provided this remains less than 25 deg. C. The machines can bear an average overload of 25 per cent. for two hours or 50 per cent. for five minutes without raising the temperature more than the 55 C. above that value. The transformers are not built to withstand a constant temperature of more than 50 deg. C. above that of the surrounding air. The temperature is taken in the upper part of the oil tank.

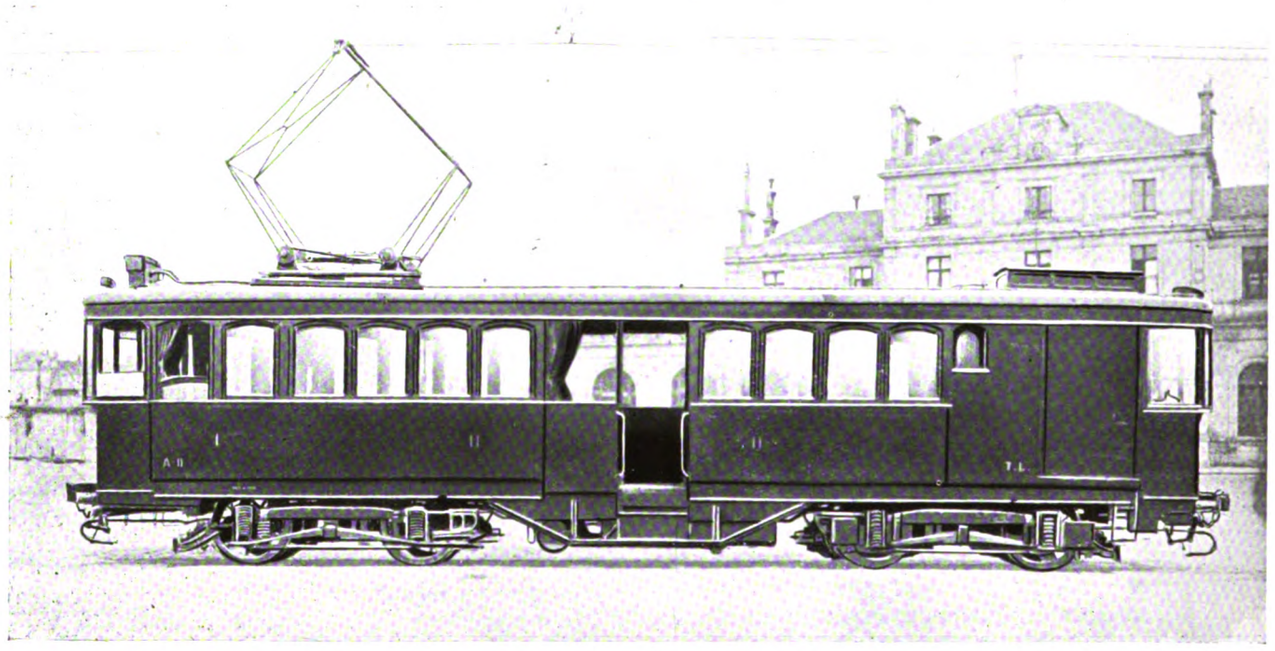

Fig. 6.—Passenger Motor Car with Luggage Compartment.

The general features of the motor cars and trailers are clearly shown in Figs. 6 to 11. The motor cars are mounted on a motor bogie and a trailing bogie, while the goods cars have two motor bogies. The trolley is of the pantagraph type. Starting is effected by

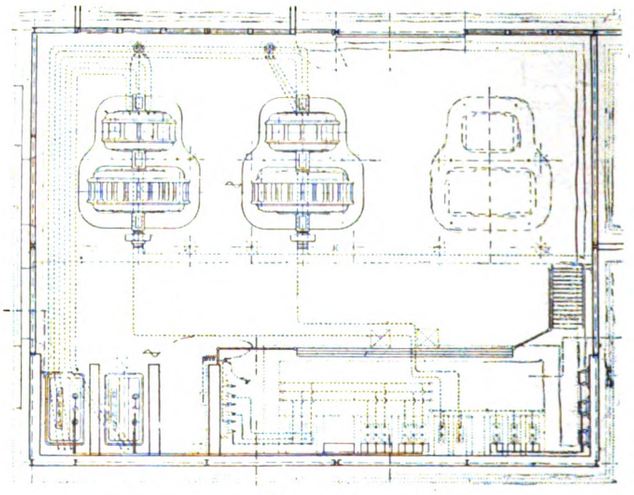

Fig. 5.—Plan of Sub-Station at Libourne.

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connections to each motor. Speed is gradually acquired by passing the controller over notches of rising potential from the secondary of the transformer. Finally, the running connections of the motors arrange themselves automatically in series-repulsion just before the regular running speed is attained.

Current at 6,600 volts is taken from the overhead wires by the pantagraph, which is pressed upwards by a spring, but which can be lowered by admitting compressed air through the valves. The handles on these valves may be removed, and the lock of the high-tension chamber is so connected with them that access cannot be obtained thereto till the pantagraph has been lowered.

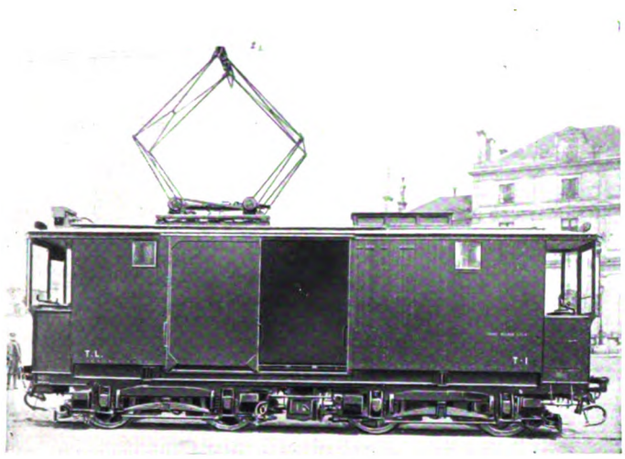

Fig. 7.—Goods Motor Car on the Line.

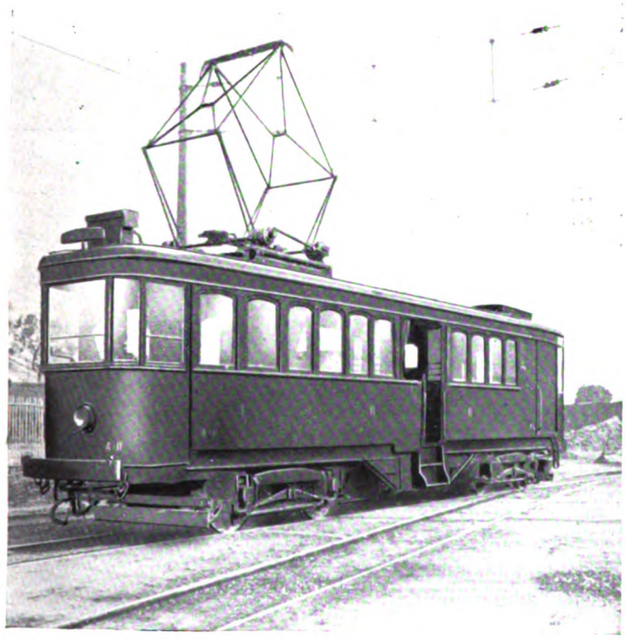

Fig. 8.—Passenger Motor Car.

Current passes from the pantagraph to the fuses, which can carry 7,500 volts, 100 amperes. Thence it passes to a high-tension circuit breaker of the oil type and of the same capacity. This is worked by hand, but is only held in position by the action of a coil whose circuit is governed by a circuit breaker. This coil consequently breaks the circuit when its current is cut off from the controlling point by the circuit breaker. Similarly the breaking is effected if the current is stopped by the lowering of the pantagraph, and the same result is obtained if the fuse blows.

The high-tension cable is very short and perfectly safe, since it is covered by a metal tube. Similar precautions have been taken in the case of the fuse placed between the pantagraph and the circuit breaker. It is placed on the roof, and can only be reached by the staff when it is necessary to replace the fuse.

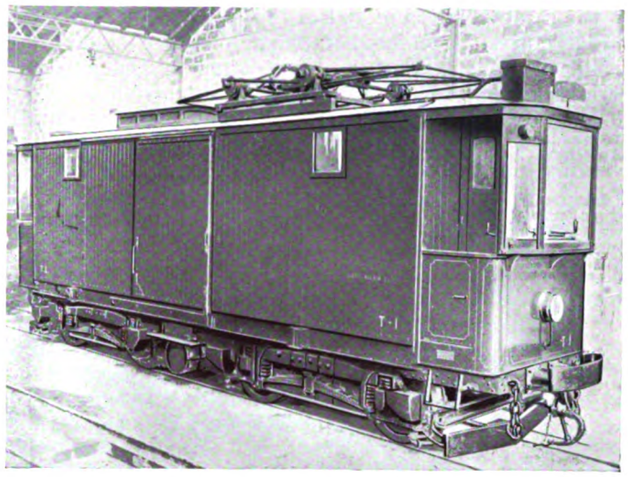

Fig. 9.—Goods Motor Car in Depot with Pantagraph Lowered.

The transformer, for a primary tension of 6,600 volts, whose secondary tension is variable according to the notch used, is of the Thomson-Houston oil-bath type. The oil container differs in the motor cars and goods motors; in the former it is of cast iron, and is placed below the underframe, while in the latter it is of sheet iron, and placed inside the vehicle. Cooling is ensured in the first case by the access of the air to the whole surface of the container, in the second by an air pipe just under the apparatus.

The primary winding leads from the high-tension circuit breaker to earth. On the secondary winding the various connections allow the speed to be changed without jerks. The accessory circuits, heating, lighting, compressed air, and circuit-breaker coils, are fed by connections designed to obtain the most suitable voltages.

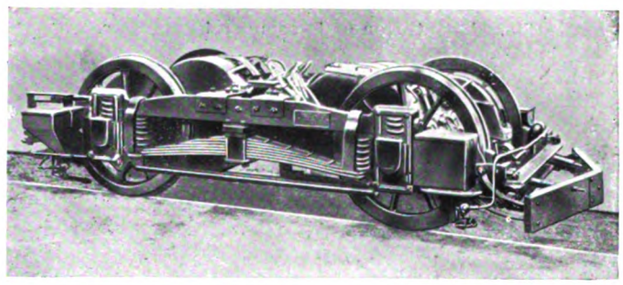

Fig. 10.—Bogie Motor Truck.

The motors are of the tramway type (55 H.P.). They are of a recent design, and they are just as reliable as the direct-current motors. The axles are driven by single-reduction gear. These motors have four poles, and four rows of brushes. The latter are the more easily attended to, as the two doors placed respectively at the top and bottom of the motor case are very large. Interior ventilation is effected by a small fan placed on the end of the axle opposite to the commutator. Dust is kept out by sheets of metal suitably perforated. Moreover, the air pipes inside are so arranged as to prevent the dust coming in contact with the coils.

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All the high-tension arrangements have been made with a view to the safety of the staff and passengers. The same care has been applied to the entire equipment to ensure regularity of running. The driving of the car is as simple as it is safe, for the motorman is in the same position as if the vehicle were running on direct current. Indeed, starting is effected by a controller of the usual design. The connections repulsion-series-repulsion take place automatically without distracting the driver's attention. The rising potential applied to the motors is regulated by the controller, which varies the connections with the secondary of the transformer in order to change the speed.

Three brakes are provided, viz.: A powerful hand brake with handle and pawl, a Westinghouse air brake acting automatically on motor car and trailers, for ordinary circumstances, and a Westinghouse air brake for use on the motor car alone for hills and stoppages. The compressed air, of which the pressure is regulated automatically, is supplied by an electric compressor for a monophase current of 240 volts. The automatic regulator effects the stopping and the starting governor of the compressor motor.

The cars are lighted by low-voltage incandescent

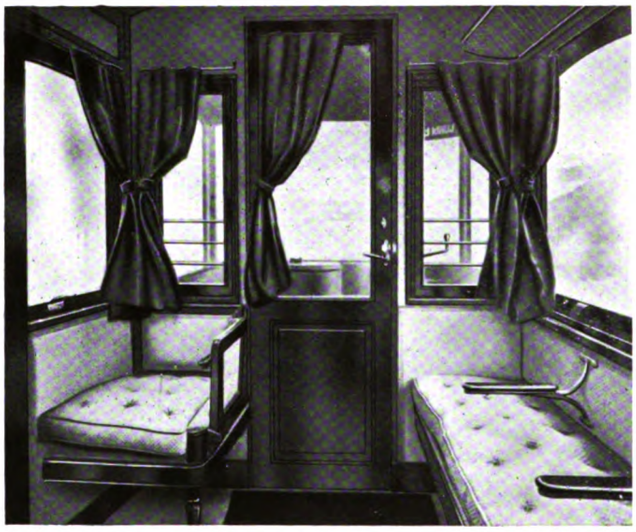

Fig. 11.—Interior of Passenger Motor Car.

lamps fed directly from the car transformer. Heating is effected in the motor cars by one of the low-potential connections of the transformer. The apparatus used is similar to that of direct-current tramways.

Since its introduction last spring, the installation has worked in perfect order, and has not required any alteration or repair.

NEW AND PROSPECTIVE WORK.

Pennine Tramway Scheme.—A light railway scheme is being forwarded by Mr. Lawton, of New Moston, Failsworth, having for its object the construction of 52 miles of tramway on the Pennine ridge. The line would link up the hill termini of the Rochdale, Stalybridge, Hyde, and Oldham tramways, and it has been suggested that those undertakings would supply the current on favourable terms, as the traffic being mainly of a pleasure character would be carried at a time when the power demands of those tramways are at their lowest. The scheme owes its origin to the popularity of the routes serving the hill district.

Rochdale Car Depot Loan.—The Board of Trade have sanctioned the application of Rochdale Town Council for a loan of £17,000 for the construction of a tramcar shed and workshop in Mellor Street.

Electric Traction in Italy.—The Minister of Public Works has approved the scheme for an electric metropolitan railway from Sampierdarina, near Genoa, to Quarto (about 6½ miles) at a cost of about £1,200,000.

THE WAR AND TRACTION INDUSTRIES.

Great Prospects for British Firms.

The Foreign Office, the Colonial Office, and the Board of Trade have during the past month taken active steps to help British manufacturers in the efforts which they are making to capture some of the German and Austrian trade in British Colonial and in neutral markets which has been cut off from Germany and Austria by the war and the supremacy of the British Navy. To grasp the position, it may first be noted that while Germany last year exported goods to this country of a value of £80,000,000, her total exports reached a sum of nearly £500,000,000. In 1913 this country imported £700,000 worth of German electrical machinery and appliances of all kinds. The Foreign Office and the Colonial Office are bestirring themselves to collect from neutral foreign countries and from the Colonies particulars of German and Austrian goods dealt in there, and to get samples sent home for the benefit of British manufacturers.

Perhaps it is the action of the Board of Trade which will most concern British manufacturers of electrical plant. The Commercial Intelligence Branch of the Board on August 19 sent out a circular letter along with the first instalment of a series of monographs on special groups of trades. In this letter it was stated:

"The Board of Trade are undertaking a campaign to assist and supplement the efforts of British manufacturers and traders to take advantage of the present opportunity to establish tnemselves in foreign and Colonial markets in branches of trade which have hitherto been largely in the hands of their German, Austrian, or Hungarian rivals. . . . It need hardly be pointed out how important the matter is from the point of view of preserving continuity of employment for our industrial population, to say nothing of the possible ultimate gain to British overseas trade. The Director of the Commercial Intelligence Branch, whose offices are at 73, Basinghall Street, E.C., will be ready to receive and answer personal and written inquiries for further information with regard to particular trades and markets. The Board of Trade are also obtaining information as to the commercial and financial situation in the Dominions and foreign markets, and particulars on this subject will be circulated in the course of a few days."

Electrical Machinery.

The monograph on electrical appliances and apparatus is a pamphlet of no less than 48 pages, most of which are taken up with voluminous notes on the character of the trade in the Dominions and foreign countries. The appended statements give the essence of the matter as regards exports from Germany and Austria.

Statement for a recent year of the value of certain descriptions of electrical appliances and apparatus exported from Germany and Austria-Hungary to all destinations:

	Exported from Germany (1912).	Exported from Austria-Hungary (1913).
	£	£
Dynamos, electro-motors, converters, transformers, etc.	2,521,000	62,000
Ready worked armatures, commutators, etc.	382,000	—
Storage batteries, spare plates for same (electrodes) Without celluloid, vulcanite, etc.	319,000	326
With celluloid, vulcanite, etc.	38,000	
Electric arc lamps, mercury vapour lamps, etc.	133,000	16,900
Complete frames for arc lamps, mercury vapour lamps, etc., with glass globes (also covered with network)	28,000	
Search-lights—light diffusing reflectors	54,000	—
Metallic filament and metal wire lamps	2,307,000	223,000
Carbon filament, Nernst, etc., electrical incandescent lamps	170,000	
Electrical appliances for illumination, transmission of power, etc.; series resistances and shunt resistances, etc., and parts thereof	2,082,000	85,500
Total of the oregoing	£8,034,000	£387,720

The following statement shows, for a recent year, the value of dynamos, electro-motors, and other electrical machinery exported from Germany, Austria-Hungary, and the United Kingdom, to all destinations:

Exports of dynamos, electro-motors, and other electrical machinery:

From Germany (1912)	£2,521,000
From Austria-Hungary (1913)	£62,000
From United Kingdom (1913)	£2,269,000

The principal markets for German dynamos, etc., are Argentina, Russia, Italy, Japan, Spain, Netherlands, Brazil, and the United Kingdom—the bulk of the trade being in the heavier kinds of machinery. The aggregate value of German exports of electrical machinery to 16 of her principal markets in 1912 was £1,892,000. The principal markets for Austrian-made dynamos, etc., are Italy, Roumania, Bulgaria, Turkey, and Greece. The value of the exports to her principal markets in 1913 was £35,750 The value of the exports in 1913 of electrical machinery of all kinds from the United Kingdom to the principal markets where there is competition with German and Austrian manufactures was £1,366,100, compared with a combined German and Austrian total of £2,583,000, so that there is ample scope for the development of British trade in this class of goods. Statistics

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are also given of the values of exports of electric glow lamps, the aggregate figures being: Germany, £2,477,000; Austria, £223,000; United Kingdom, £152,000. The exports of sundry other electrical appliances are also tabulated.

Wheels and Axles.

Numerous pamphlets dealing with different industries were subsequently issued by the Board of Trade. In one dealing with railway (and to some extent tramway) wheels and axles (complete) and tires and axles, the Board of Trade say:

The value of railway axles, parts of railway wheels (hubs, tires, frames, etc.), railway wheels, and sets of railway wheels exported from Germany to all destinations in the year 1912 was £1,377,000. The 18 countries receiving the larger amounts included the following: United Kingdom, £40,000; British India, £60,000; Canada, £90,000; Australia, £199,000; France, £40,000; Italy, £275,000; China, £62,000; Japan, £88,000; Brazil, £63,000. The aggregate value to the 18 countries was £1,095,000. An Austrian export trade in this class of goods practically does not exist. The British exports to the same countries, the United Kingdom, of course, excluded, totalled £1,210,000, the largest items being the following: British India, £461,000; Australia, £284,000; Argentina, £285,000; Brazil, £50,000. To the other countries the amounts are small.

The Board of Trade proceed to say: The aggregate British exports to the above markets therefore exceed those of Germany, but while the United Kingdom easily takes the first place in supplying these goods to British India and Argentina, Germany takes the bulk of the trade in the other markets specified. It should be possible at the expense of Germany materially to increase our exports to Canada, Australia, Scandinavia, Southern Europe (particularly Italy and France), to the Dutch East Indies, China and Japan, and Brazil.

Competition from Germany with British manufactures of railway axles, wheels, and tires during the last few years has been extremely keen. In many foreign and colonial markets, but particularly in the various Dominions, large contracts have been placed with German manufacturers. It is obvious that a number of the contracts, which were under execution or which had just been placed in Germany before the war, cannot now be fulfilled in that country. In the case of Australia, where competition from Germany in this class of material has recently been severe, the Board of Trade have heard by cable from H.M. Trade Commissioner in Melbourne that the Federal Government have decided to continue the execution of their public works. When conditions become more settled in other neutral markets, a considerable amount of work now let to German manufacturers will probably come into the market, and it will therefore be advisable for British manufacturers to strengthen their position in those markets where German competition has been most seriously felt in order that they may be able to take advantage of such opportunities.

In the notes relating to various oversea markets the following interesting passages occur regarding the market for tramway wheels and axles in Adelaide, South Australia.

H.M. Trade Commissioner for Australia recently wrote as follows regarding purchases of tramway wheels and axles:

"During my recent visit to Adelaide the chief engineer and general manager of the Municipal Tramways Trust promised to give me particulars of tenders received, with the names of the successful tenderers for material required during the last three years, including amongst other items gear wheels and axles. The total amount of the purchases by tender from oversea manufacturers was over £77,000, of which an order for wheels and axles for maximum traction trucks accounted for £1,057 10s., and orders for 275 gear wheels and 250 axles for £945 6s. 3d. and £810 8s. 4d. respectively. Messrs. Krupp tendered as follows for the wheels and axles for maximum traction trucks:

	£ s.
"1. To specification, plus £60 for Krupp's special light-weight centres—mileage guaranteed as follows: drawing tires, 60,000 miles. Pony tires	1,333 0
"2. Axles, special steel, centres, and tires to specifications, plus £60 as above ..	1,374 0
"3. Axles and centres to specification special steel, plus £60 as above	1,471 0
"4. Axles and tires, special steel, plus £60 as above	1,612 5

"Messrs. Krupp did not secure this contract, but succeeded in obtaining that for the supply of 250 axles, their price being £3 4s. 10d. per axle, with delivery in 25 weeks, against £3 10s., with delivery of 125 in 12 weeks, the lowest British tender."

Implements and Tools.

A great mass of detail is given in the report on implements and tools, both as regards the exports of different classes of tools and as regards the markets for them. All that is necessary here is to quote the following statement, which shows, for a recent year, the value of industrial and agricultural implements and tools exported from Germany, Austria-Hungary, and the United Kingdom respectively to all destinations.

Exports from Germany (1912).

	£
Industrial implements and tools	2,753,000
Agricultural ,, ...	1,431,000
Total -	£4,184,000

Exports from Austria-Hungary (1913).

	£
Industrial implements and tools	82,700
Agricultural ,, ,, ...	222,200
Total -	£304,900

Exports from the United Kingdom (1913).

	£
Industrial implements and tools	2,050,700
Agricultural ,, ,, ...	745,900
Total -	£2,796,600

The United Kingdom has a long lead in regard to industrial tools over Germany in British India, in Canada, and Australia, as well as in East, South, and West Africa. Germany leads in the French, Italian, Roumanian, Russian, and the Dutch East Indian markets, while the competition between the two countries is severe in Norway and Sweden, Spain, and in South America and the United States.

Internal Combustion Motors, Gas Turbines, etc.

The report on internal combustion and explosion motors, gas turbines, etc., gives the following figures for a recent year of the value of certain descriptions of internal combustion and explosion motors, gas motors, etc., exported from Germany and Austria-Hungary to all destinations:

Exports from Germany (1912).

	£
Stationary combustion and explosion motors; blastfurnace gas motors	1,472,000
Steam and gas turbines in combination with dynamos, pumps, hammers, blowing machines, freezing machines, hoisting machines	617,000
Combustion and explosion motors, blastfurnace gas motors in combination with dynamos, pumps, hammers, blowing machines, freezing machines, hoisting machines	81,000
Individual parts for steam engines, steam and gas turbines, water power engines, stationary combustion and explosion motors, blastfurnace gas motors, hot-air and compressed-air motors, cranes, etc....	656,000
Total of above...	£2,826,000

Exports from Austria-Hungary (1913).

	£
Motors not specially mentioned (including combustion and explosion motors, but excluding motors for automobiles, steam motors, and electric motors)	£37,000

Similar particulars for the United Kingdom are not available.

By another table it is shown that the principal German markets for stationary combustion and explosion motors and blastfurnace gas motors were Russia, France, Argentina, Roumania, Egypt, and the United Kingdom. Steam and gas turbines combined with dynamos, pumps, hammers, etc., were sent mainly to Russia, the United Kingdom, Spain, British South Africa, Italy, and France. Combustion and explosion motors combined with dynamos, pumps, etc., were exported mainly to Russia. The principal markets for parts of steam engines, steam and gas turbines, and combustion and explosion motors were naturally much the same as for complete motors. Extended notes are given as to the various classes of motors required in the Dominions and foreign countries.

Tramways v. Omnibuses at the Busy Hours.—In the report on the accounts of the London County Council Tramways for the year ended March 31, presented by the Highways Committee, the following paragraph occurs: "Assuming it were economically possible for the omnibus to expand its service to meet the requirements of traffic at the busy hours, the effect of the congestion in the streets would be very serious, as, for the carriage of a given quantity of traffic, motor omnibuses would occupy much more space than tramcars. If electric cars were entirely withdrawn and the same seating accommodation had to be provided by motor omnibuses as is now provided by tramcars, 3,109 omnibuses, or an increase of 114 per cent. of vehicles over the number of tramcars would be required during the fine weather, while during inclement weather, when only the inside seats of omnibuses are usable, 7,513 omnibuses, or an increase of 418 per cent., would be required." In conclusion the report states: "The committee feel sure that the Council will agree that every possible step should be taken to improve the present position of the tramways, and still further to add to the utility of the great service they perform in coping with the problem of passenger transport in London. In particular the committee would urge that every facility should be given for the pressing forward of the necessary linking up of the tramway system. If the tramways are to be placed on a remunerative basis it is of paramount importance that means should be devised whereby this linking up and extension may be accomplished with the least possible delay."

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THE
Tramway and Railway World

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LONDON, SEPTEMBER 10, 1914.

The War and British Tramways

British tramway traffic receipts have been less affected by the calamitous European war than the revenues of many other industries. Still, in many cases there has been a falling off, and steps have been taken to reduce working expenses as far as possible to meet the reduction in revenue. In some places there has been a reduction in the car services, partly because so many employees have joined the colours. Elsewhere in this issue particulars are given showing how each undertaking has in this way contributed to the national need. In many cases the record is all that could be wished, but in others it is to be hoped that recruiting has been increased since the figures were supplied to us. But even when much larger numbers have responded to the nation's call it does not seem likely the effects on tramway business will be very serious. The earnings will, however, depend to some extent on the success of the movement to prevent extensive unemployment among the working classes. Employers generally appear to be doing what they can in the matter. In regard to tramway working expenses, we are in the fortunate position of not having to pay more than usual for coal and for many of the usual supplies. Thanks to the Navy, the only foreign market of importance closed is that of Germany and Austria, and British tramways have no need to apply to these countries. In regard to new and renewal work, it is quite likely that more of that will be undertaken shortly than in ordinary times. It is gratifying to observe that wherever there is a prospect of many men being thrown out of employment, tramway authorities are willing to undertake pending extensions, track renewals, and so forth, with the object of providing as much work as possible. It cannot be denied that the declaration of war led to a sort of panic in some British industrial circles, and there was more dislocation of trade and more men were dismissed than was called for by the circumstances. That has now passed off, and employers see the situation more sanely. The result is likely to be that both employment and tramway revenues will shortly begin to improve.

Effects on Traction Industries.

In regard to the effects of the war on the British industries which are associated with electric traction, it now appears probable that on the whole they will be better off than before. Both the manufacturers and their customers were naturally alarmed when war was declared, and some buyers went so far as to suspend or delay contracts into which they had entered. Probably by this time they are sorry that they did so. The cool head is returning, and with every confidence in the ultimate success of the Allies in the war steps are being taken which ought to produce a great expansion of business among British electrical manufacturers. The tremendous German competition in the business—a competition fostered at every turn by protection—has been suddenly cut off. No German goods can be exported to any part of the world, and great markets are opened to British manufacturers. The Board of Trade are doing their part in the way of supplying information and advice, as may be seen from the summaries of some of their publications on German exports included in this issue. Besides the colonial and foreign fields thus opening up, our manufacturers no longer have to compete with Germany in the British market. Already we hear of the cancellation of contracts with German firms being followed by orders given to firms in

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England. There are signs that strong efforts will be made to capture the German trade, and that these will be largely successful. One has but to mention such things as turbines, generators, motors, rails, and incandescent lamps in order to get an idea of the extent of the field. It is a unique opportunity. More capital will be needed, and in present circumstances the banks must be looked to in the first place to furnish it. They have been a little reluctant, but evidently that stage is nearly over. Thus there ought to be much business and much employment to make up for the business and employment unavoidably lost owing to the war. That our manufacturers are fully prepared to meet all demands is abundantly proved by the brief reports from many of them which appear on other pages of this issue. All classes of electric tramway and railway supplies can now be obtained promptly from manufacturers and dealers in this country; and the industry need not be in any way affected by conditions on the Continent. Buyers both at home and throughout our overseas dominions, who may have been accustomed to place orders with German firms, need be in no way inconvenienced. Their needs can be promptly supplied by British firms, and they may rest assured that in respect of quality and workmanship the change will be to their advantage.

A Volunteer General Transport Corps.

We have consistently and insistently urged the co-operation of all means of public conveyance, whether by train, omnibus, or tram, but so far with little success. Of late years, however, signs are not wanting that the mutual advantage of such amicable working together is beginning to be realised. As the population in these isles becomes more and more congested, so it will be borne upon all those who cater for their conveyance that there is room enough and to spare for every kind of transport facilities. The so-called T.O.T. in London is a valuable object lesson in this direction, and all over the country tramway authorities are beginning to look upon motor omnibuses, whether dependent on an overhead wire for power or as free rovers, as valuable auxiliaries and feeders. In these troublous times it is more than ever advisable, if indeed it is not of absolute necessity, that rail, tram, and omnibus services should work under one general management—while the crisis lasts. Many years ago, the Engineer and Volunteer Staff Corps was formed; from time to time, problems were put to them by the War Office for solution by means of a settled programme. For instance, the problem would be: To deliver an army corps complete, say at Grimsby, with troops from various parts of the Kingdom within a certain time. The programme drawn up as a solution to the problem would give in detail the time-tables of the trains required, their composition, and their provenance. No doubt the Committee of General Managers in whom the Government have now vested the control of all our railways, have worked to some programme previously prepared. This staff corps is composed of general managers, and of chief and consulting engineers. When it was first formed means of transport other than railways were a negligible quantity: that is not the case at the present time, so it would be well if the chief officials of all tramway undertakings and omnibus companies were appointed to this staff corps, to work in conjunction with the present members and under the same conditions. Seeing the enormous number of passengers dealt with, especially at rush hours, there would appear to be no difficulty in taking some 200,000 men across London, for instance, in a few hours by trams alone; this number could be enormously increased if the motor 'buses joined in the service and so kept up parallel streams of vehicles along every available and parallel street. To ensure the success of such a manœuvre no dead ends should be allowed in populous cities under any consideration, for strategic reasons alone; the linking up of all existing tramways should be an integral part of the scheme—which, if properly carried out, could relieve railways, at times and if necessary, of nearly all their passenger traffic, and so leave them free to transport troops and war material to any extent. When the war was over, the beneficial effect would remain of having worked together, shoulder to shoulder, during a national crisis, as will haply be the result of the present relations between working men and their employers. Misfortunes make strange bedfellows—but having once been brought together, strangers and even rivals see clearly the enormous advantage to all of friendly co-operation.

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The Government and Light Railways.

As an item of news connected with the State provision of employment during the war, it was announced in the daily Press recently that the Development Commissioners were considering schemes for the construction of light railways, for improving waterways, and for draining the Fens. Through announcements made during the past two years in these columns, our readers are aware that the Development Board, after three years' existence, have found themselves unable to record any progress in so important an object of their existence as the encouragement of transit schemes. This statement applies both to vehicles running direct upon the road and upon rails. An unfortunate aspect of the Commissioners' failure to solve this problem is that great anticipations of agricultural development were held out by the Chancellor of the Exchequer in the speech in which he submitted the plans for the establishment of the Development Board. The reason why the Board have failed to achieve the desired result is set forth in their annual statements for the past two years, report following report without producing from the Treasury any indication that they realise the necessity for a revision of the scheme if it is desired to secure the fulfilment of its objects. Whether the Commissioners have now succeeded under the stress of war in inducing the Government to permit them to make an attempt to retrieve the situation remains to be seen, but as it is open to promoters to present road motor projects as well as proposals involving the use of rails, there ought to be no lack of applications to learn the new conditions upon which the Commissioners propose to act. One or two road motor schemes were rejected in the first year of the Board's existence owing to the unsatisfactory nature of their financial outlook. The chief reason, however, for the failure of the Commissioners' transit powers is, as they explained a year ago, to be attributed to a regulation that debars them from rendering any assistance to undertakings instituted by persons or companies for the purpose of making a profit. In their report the Board suggested that that difficulty might be met by the formation of Development Associations not working for private advantage. Apparently a Scotch county is the only place where this suggestion has been adopted, but although the Association has been in existence for more than a year, there is apparently no indication that appreciable progress has been made with a scheme which had been put forward for the construction of a light railway. An important point upon which the traction industry will look for enlightenment in the Board's next annual statement will be the nature of the advice which has been tendered to the Commissioners in the report which they had called for in reference to the construction of light railways. It is time, too, that the membership of the Board should comprise a traction expert.

MUNICIPAL TRAMWAY CONFERENCE.

We are officially informed that at a meeting of the Executive Council of the Municipal Tramways Association held in Manchester on August 14, it was decided that in view of the present state of affairs due to the European crisis it was inadvisable to hold the annual Conference of the Association which was to have taken place at Salford in the end of September. All the arrangements have accordingly been cancelled. The annual meeting, as distinct from the Conference, will be called later, and due notice will be given of it. In the meantime the present officers will continue to hold their positions.

THE INTERNATIONAL TRAMWAY CONGRESS.

As announced in previous issues, the Executive Council at Brussels on the outbreak of war promptly cancelled all arrangements for the Congress which was to have been held at Budapest early this month. As an indication of the calmness with which our Belgian friends attended to business, even in the first shock of the German invasion, we may mention that we were informed by telegraph of this decision on August 6, and it was announced in our issue of August 8. Although German troops are in occupation of Brussels, it is not at all likely that there has been any interference with the office of the Union at 23, Rue d'Arlon, but the routine work has, of course, been suspended owing to the cutting of the usual means of communication. The warmest sympathy of British tramway men is extended to their Belgian confrères in the terrible experiences through which they are passing. Many of them have been in active service, and we have no doubt they have worthily helped to sustain the cause of their country and its allies against the brutal and tyrannical invasion of the freebooters of Europe.

CHAIR OF RAILROADING IN HARVARD UNIVERSITY.

A plan having for its object the endowment of a professorship of railroading in the graduate school of business administration of Harvard University is near consummation. The sum of £20,000 has been pledged. The total amount required is £25,000, though it is proposed to raise additional funds to the amount of £50,000 for instruction in railroading. The chair will be named in honour of James J. Hill. The plan is said to have been started by Howard Elliott, chairman of the New York, New Haven, and Hartford; Robert Bacon, former ambassador to France; and Thomas W. Lamont, a New York banker.

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CORRESPONDENCE.

Arc Lamp Carbons.

To the Editor of the Tramway and Railway World.

Sir,—As it is impossible for us to explain the position in the arc lamp carbon industry individually to all enquirers and users, we should be glad of the hospitality of your columns for this purpose.

Our carbon works is the only factory in Great Britain, and the enormous preponderance, approximately nine-tenths of the carbons used in this country, have been imported from abroad from factories in Germany, Austria, and France, which for some time to come cannot send supplies. A very small percentage of the carbons imported came from small Swiss and Spanish works who can do little, if anything, to relieve the situation. A factory exists in the United States, but will be called upon to make up for the large American demand hitherto supplied by Germany. In addition, it must be remembered that the British dominions have been large buyers of German-made carbons.

Under the now prevailing circumstances we have not been surprised during the past three weeks to receive enormous demands for carbons for both immediate and forward delivery. In less than a week we could have sold our output a year ahead. A few of these enquiries come from our old customers; the majority from the large users, such as railway companies and municipalities, who have consistently refused us their support in the past, on account of the cheaper prices of German and Austrian carbons.

Our endeavours to educate users to the necessity of supporting the only English works with only a small portion of their requirements have been constant for 12 years, but without practical results.

When our works were started 12 years ago the prices ruling for carbons were about double those recently prevalent in this country. The starting of our works was met by a persistent policy of price cutting on the part of our competitors, which at once made the factory unremunerative. In spite of this we have kept our works running, because we recognised the possible disaster if this country had not at least one source of home supply. This policy has involved our company in a loss amounting to over £70,000, which has naturally not encouraged us to increase the factory to a size capable of supplying a reasonable share of the English demand.

We are, therefore, now faced with a demand some 10 times as great as we can satisfy. After serious consideration we have decided to act upon the following principles:

(1) In the first place we shall, of course, supply all naval and military demands.

(2) We have raised prices, not merely to a remunerative level, but sufficiently to prevent buying by those who are not in absolute need. In this connection we realise that it is possible for many of the largest users to replace temporarily their arc lamps by other forms of lighting. such as metal filament lamps, and those who are in this position should be encouraged to do so.

(3) We shall dispose of our present stock of carbons of all kinds according to the above principles, but as far as manufacture is concerned, we shall adhere to the programme described below.

(4) We propose to limit our manufacture to as few types and sizes as possible in order to obtain the maximum output from our existing works.

We would point out in this connection that by reducing the number of sizes we make our output can be very materially increased, as the machinery can be utilised to the best advantage.

In deciding what sizes we shall make, we have been principally guided by the consideration of what types of arc lamps can best be replaced by other forms of illuminants, and as far as possible we are therefore confining our manufacture principally to those types of arc lamps which in our opinion cannot easily be replaced.

We propose, therefore, in the first place to make carbons for magazine flame lamps, as there are many thousands of such lamps in use of two or three well-known makes using the same sizes of carbons. Subject, of course, to possible Government requirements, our output of these magazine carbons should be sufficient to meet all demands. These carbons are 9 mm., 8 mm., and 7 mm. in diameter, in 15 in. and 12 in. lengths. Similar carbons, with the addition of 10 mm. diameter —if provided with metal cores—can be used in these lengths in practically all converging carbon flame lamps.

Secondly, we shall manufacture a certain quantity of 11 mm. and 13 mm. enclosed lamp carbons in 12 in. and 10 in. lengths, as enclosed lamps are used for certain purposes for which other sources of lighting are not suitable.

Thirdly, we propose to make a certain quantity of carbons for projection work for cinematograph and similar purposes, where the quantities are comparatively small, and where also any other source of light is inadmissible. The stoppage of these supplies would paralyse the whole trade, and cause very great distress.

As we realise that the amount of open-type carbons which we could by any means produce would be a mere drop in the ocean, we shall discontinue for the time being the manufacture of these entirely.

We are confident that in taking this course we are acting in the best interest of carbon users and the public generally, and hope our policy will meet with general support. Individuals will realise that where it is absolutely impossible to satisfy all, we are taking a course which enables us to satisfy the greatest number in our power.

Yours faithfully

(For and on behalf of the General Electric Company, Limited),

K. Alwood,

Secretary.

The Use of Meters on Tramcars.

To the Editor of the Tramway and Railway World.

Sir,—In regard to the letter of Mr. Sharp in your issue of June 11, I wish to state that Mr. Sharp evidently does not know how to read. I had mentioned the cost of upkeep to be 4·45 frs. per meter per annum, that is 3s. 6½d., and not "approximately £1," as Mr. Sharp tries to make believe.

In view of this fact I think with Mr. Sharp that further remarks from him are unnecessary.

Yours faithfully,

The Hague, P. M. Montijn.

July 6, 1914.

To the Editor of the Tramway and Railway World.

Sir,—I have to thank you for kindly giving me an opportunity of replying to Mr. Montijn's letter of July 6.

I did not overlook the fact that in Mr. Montijn's previous letter he mentioned the cost of upkeep per meter as 4·45 frs. *per annum*, but as he mentioned that the meters were taken into their laboratory five times in a year this only allowed 90 centimes on each occasion; therefore I naturally assumed that the words "per annum" were used in error. If Mr. Montijn is able to take a meter off a car, have it tested in his laboratory (and presumably adjusted), and then refix again for less than 9d., I can only agree with him that further remarks from me are unnecessary—or at all events inadvisable!

Yours faithfully

(Venner and Company),

August 5, 1914. Ernest E. Sharp.

THE NEED TO KEEP WORK GOING.

The Council of the British Electrical and Allied Manufacturers' Association have sent the following letter to the principal railway companies, municipal corporations, and other large purchasers of electrical plant and apparatus in Great Britain. The importance of the point urged will be evident to all:

The British Electrical and Allied Manufacturers' Association,
King's House, Kingsway, London, W.C.,
August 14, 1914.

THE WAR AND TRADE.

Sir,—There are many evidences of a tendency on the part of purchasers (by no means the smallest) to take advantage of clauses in their contracts to suspend and delay work on account of the war, and the members of this association, who employ tens of thousands of working men, are already so affected in respect of contracts representing over a million pounds sterling.

Should such suspension and delay become at all the common practice, the result, for working men, would be disastrous.

One of the primary duties of every Britisher at the present moment is to maintain employment as far as ever possible, and my council desire to appeal for the prompt and sympathetic consideration of this question by all present or prospective purchasers of electrical goods and goods used in connection with electrical work.

Our own Government, by common consent, has set an excellent example, financially and otherwise, and has given every assurance towards allaying traders' fears.

The Colonial Governments have done the same, notably the Australian Government, who have publicly exhorted their own importers to keep up and extend trade with Britain, recognising at once the extremely important issue involved, both now and in the future.

On behalf of the Council of this Association, I commend this matter to your earnest consideration.

Yours faithfully,

F. R. Davenport,

Chairman of Council.

Tramways Extension in London.—The London County Council have approved the recommendation of the Highways Committee for the construction on the conduit system of the tramway in Seven Sisters Road (acquired from the Metropolitan Electric Tramways) at a cost of £16,450; and for a third tramway track to be laid in Blackfriars Road at a cost of £3,500, and a lay-by in High Street, Plumstead, at a cost of £1,115. The consideration of the proposal for the construction of a tramway in High Street and East Hill, Wandsworth, at a cost of £16,000, was postponed.

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BUSINESS AS USUAL.

WHAT OUR MANUFACTURERS ARE READY TO DO.

In view of the fact that many of our oversea readers have been accustomed to obtain some of their supplies from sources not now available to them, the present time is an unparalleled opportunity to British manufacturers to extend their markets. Undertakings abroad are in many cases, no doubt, in need of supplies ordered in Germany, and these orders must be cancelled and new arrangements must be made with the least possible loss of time. New trade connections must also be formed so that the constant stream of material may continue to flow in as hitherto. It is thus of importance to our foreign and colonial readers to know where various classes of equipment and material may be promptly obtained in this country. To aid them as well as our own traders we asked advertisers in our pages to send to us a brief statement of material, and equipment which they could supply promptly or from stock. Many of them manufacture only to order, and the specifications which they receive are so diverse that it is naturally impossible for them to specify the time required for delivery. Among these firms are Messrs. Dick, Kerr and Company, the Electric Construction Company, and the British Westinghouse Electric and Manufacturing Company. All of these would be glad to give the most careful attention to all inquiries, and could no doubt arrange satisfactory deliveries.

A large number of other firms have been able to reply to our inquiry more or less exactly, and we append extracts from their communications, from which it will be seen that neither home nor oversea buyers need have any difficulty in fully meeting their requirements however extensive or varied they may be. It was impracticable to give here a classified directory specially compiled from the information just furnished, but readers may be referred to the "Buyer's Guide," which will be found, as usual, among our advertisement pages. We shall be glad to supplement the information given there, or in these statements, should any reader wish to make further inquiry. It is sometimes said that British manufacturers do not always meet new customers as willingly as they might in regard to the design and quality of articles ordered. This we have reason to know is not the case with those associated with the traction industry. Their constant effort is to give users exactly what the latter consider to be the equipment best suited to their needs. British tramway material already is in use very largely abroad, and in quality it is second to none. Oversea buyers may therefore feel confident that orders sent to this country, notwithstanding the turmoil in which Europe is so sadly involved, will receive prompt attention and in such a manner as will be highly gratifying to them.

Ailsa Oilskin and Rubber Company,
Dalry, Ayrshire.

We thank you for your practical suggestion. We hold a good stock of well-seasoned material for making up on the shortest notice, as we were fortunate in having a good stock of raw materials before the war broke out. We have lately made considerable improvements in our oilskin garments and waterproof covers which add to their life and waterproof quality, and a system of ventilation adds to the comfort of the wearer. Where economy is imperative, we are prepared to carry out repairs and re-dressing of oilskin garments at a nominal rate with a view to keeping our staff employed.

Albion Motor Car Company, Limited,
Scotstoun, Glasgow.

Owing to the number of heavy Albion vehicles ordered by the War Office our delivery of these is rather far ahead, but we are in a position to give more favourable delivery of lighter types to carry from 10 cwts. to 2 tons. Our catalogue gives full particulars of all our productions, ranging from light commercial vehicles to carry 10 cwts. to heavy vehicles for loads of 4 tons, also passenger vehicles to seat eight persons and upwards.

Edgar Allen and Company, Limited,
Imperial Steel Works, Sheffield.

As stated in an advertisement in this issue, we are now in a position to give prompt deliveries of standard points and crossings in manganese steel, and quick deliveries for any special work that may be required, say two to four months, according to the size of the junctions and the number of patterns to be made. We can also give quick delivery of any kind of tool steel, high-speed steel, files, saws, motor cases, wheel centres, and steel castings of every description.

Anger Manufacturing and Supply Company, Limited,
Bank Chambers, Preston, Lancashire.

We are glad to state that most of the material we handle is of British manufacture, and that we are glad to supply upon short notice the following: Steel tires, axle boxes of all types, wheel centres, truck spares, sand boxes and sanding devices, destination signs and screens, steel axles, tramway springs, trolley cord, steel rails and fish plates, rattan for car seats, car curtains, carborundum, safety treads, tramcar steps, axle box fittings, gear lubricants, Anger patent brake hangers, tramcar rails, gears and pinions, trolley heads, armature bearings, life-guards, lifting jacks, brake spares, Anger improved automatic brake adjusters, Eureka emergency sanding attachment, brake chains, controller fingers, rail bonds, corrugation removers, brake blocks, gear cases, tool steel gears and pinions.

Armstrong, Stevens, and Son, Limited,
Whittall Street, Birmingham.

We are pleased to inform you that we are laying ourselves out at the present moment for Government and Admiralty work, and are in a position to do any class of hand-forging work or steel drop-stampings, any shape or size from a few ounces up to hundredweights each. We have also another section of our works devoted to screwing, turning, and machining work in iron, steel, brass, and copper, and another devoted entirely to smaller screws such as machine screws, screws for electrical fittings, and small bolts and nuts. At the present time we have a large number of men working for us, and are in a position to give good and prompt deliveries for anything that is required in connection with the Government and the Admiralty.

Avon India Rubber Company, Limited,
19, Newman Street, W.

We are in a position to supply from stock all types and sizes of pneumatic tires for motors, motor cycles and cycles, grip or clinched-on solid band tires for all types of commercial motor vehicles, solid carriage tiring, ambulance tiring, etc., motor cycle belts, catches, repair bands, and general sundries for all types of motor vehicles, strip and tape for insulating, sheet rubber, etc. At short notice we can supply railway buffers and draw-bar springs, vacuum pipes, hose and tubing, washers, etc., for railway work. These goods are all manufactured at our Melksham factories.

Babcox and Wilcox, Limited,
Oriel House, Farringdon Street, London, E C.

We are prepared to supply the following: Boilers, superheaters, mechanical stokers, chimneys, water softeners, piping and valves, coal and ash conveyors, electric cranes; in other words, the complete equipment for generating stations, so far as the steam supply is concerned. We may say that we could deliver in all cases within a reasonable period of time.

John Baker and Company (Rotherham), Limited,
Brinsworth Iron and Wheel Works, Rotherham.

In our trade it is practically impossible to keep any stock of goods for the foreign market, as all goods have to be made to the drawings and specification of each individual buyer. This means that not only have the wheels, axles, and tires to be made to a special design, but in many cases the steel itself has to be made specially after receipt of the order, seeing that each engineer specifies his own tests, and, of course, the material has to be made in each individual case to meet these tests. We fully realise the importance of giving good deliveries and we are using our utmost endeavours to do this.

British Aluminium Company, Limited,
109, Queen Victoria Street, E.C.

We have pleasure in enclosing particulars which will give you some idea of the forms of aluminium which we produce, and the more important applications of the metal.

Ingot (pure or alloy) is employed for automobile engine and gear castings, radiator frames, number plates, ship, carriage, and household fittings, vulcanising moulds, cast cooking utensils, lasts, gramophone arms, name plates and letters, sticks and granules for deoxidising iron and steel, sheet and plate for car bodywork, side and interior panelling, ceilings, culinary utensils, lamp bodies and reflectors, meter cases, fan blades, repoussé work, vulcanising, latex collecting cups and pails, chemical vessels, vat linings and crystallising trays, matting for car flooring, stair and running board tread, lavatory flooring, tube for condensers and coils, tire and inner tube mandrils, speaking tubes, bran coolers and handrails, sections, mouldings, lap plates, angles, channels, strip reflectors, bow collector strip, step edging and stair nosing, wire and cable for electric power transmission, wire for netting, gauze, bangles, etc., bar and rod for busbars, switchboard, battery, and feeder connections. Also powder for paint.

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Belliss and Morcom, Limited,
Engineers, Ledsam Street Works, Birmingham.

With the large amount of our various manufactures going through our shops continually we are able to give, in reply to definite inquiries, immediate information as to current prices, deliveries, etc. Our power plant booklet illustrates and briefly describes some of our chief manufactures.

J. G. Brill Company,
110, Cannon Street, London, E.C.

The following materials could be supplied promptly and in a large number of instances from our stock at the works. We have a stock of journal boxes in this country, and could deliver in one or two days. With regard to the larger items, such as car bodies, trucks, bogies, etc., we are in a position to make prompt deliveries on receipt of detailed specification, including railway coaches (steam), passenger coaches (steam and electric), baggage and freight cars, storage battery cars, petrol electric cars, motor omnibus bodies, snow sweepers, snow ploughs, and sprinklers. We have a special plant for all-steel and semi-steel car construction. This steel car construction now forms a very large part of our product. We manufacture four-wheel single and bogie trucks for electric tramcar service, and also the very latest designs in high-speed and heavy bogies for electric motor and steam service; also electric locomotives complete with the exception of the motor equipment.

We can also supply at short notice the following rolling stock equipments: Conductors' bells, foot gongs, bronze ratchet brake handles, shafts, brake rigging, cast-iron brake shoes, solid forged steel sidebars for single or bogie trucks, truck springs, track scrapers, car couplers and drawbars, curtains and curtain fixtures, car platform gates, lifting jacks, Brill "winner" seats, seat rattan, seat springs, seat mechanism, rail sanders, car bumpers, car vestibules (portable or permanent), "exhaust" ventilators, car fenders and life-guards, bronze grab handles, roof headlining, mutually-operating door mechanism.

We have prepared a 200-page catalogue covering practically every part of a car body in the way of replicas or spares. This is the Brill order guide No. 201. We also have a special catalogue applying to trucks and truck parts. Both of these catalogues would be of immense value to parties requiring material in connection with rolling stock.

British Insulated and Helsby Cables, Limited,
Prescot, Lancashire.

We are in a position to supply on short notice all classes of insulated cables, overhead equipment for tramways, such as insulated bolts, globe strains, ears, frogs, pull-offs, and trolley wire; also rail bonds, for the manufacture of which we have now a very large plant.

J. Brockhouse and Company, Limited,
Victoria Works, West Bromwich.

We give you below a list of articles we can supply from stock, or on very short notice. Springs for horse vehicles, pleasure motor cars, commercial cars and lorries, trams, omnibuses, spring fittings, axles for horse vehicles, axles for trailer wagons, scrolls, spring clips, wagon and motor chassis ironwork, motor and wagon body ironwork, brakes for vehicles, general stampings, motor fittings, seats, wind screens, hoods, etc.

David Brown and Sons (Huddersfield), Limited,
Park Works, Lockwood, Huddersfield.

The following is a list of our products with approximate times required for delivery in each case. This time is, of course, subject to variation according to the amount of work we have on hand at any given time, also subject to the supply of raw material: Small rawhide pinions and machine-cut cast-iron spur wheels, few days; cast-steel gears, about six weeks; machine-cut bevel gears, 3-7 weeks; worm gear, 3-6 weeks; totally enclosed worm reducing gear, spur reducing gear, or double helical reducing gear, smaller sizes from 2 weeks, larger sizes from 4-12 weeks. We are prepared to undertake any description of machine cut gearing spur wheels and double helical wheels up to about 16 ft. diameter, bevel gear and worm gear up to about 9 ft. diameter. We are also opening up a considerable business in high-speed gearing for steam turbines.

"The Coventry" Chain Company, Limited,
Spon End Works, Coventry.

We beg to inform you that our products comprise pitch chains for the transmission of power on motor lorries, motor cars, motor cycles, cycle cars, and cycles. We also manufacture "The Coventry" noiseless chain drives for power transmission on printing, agricultural, textile, and every other class of machinery. "The Coventry" noiseless chain-driven speed reduction and increasing gear box is a speciality of ours. We may also add that our works and plant are admirably adapted for the quick production in large quantities of turned and screwed repetition parts.

Dryers, Limited,
53, Victoria Buildings, St. Mary's Gate, Manchester.

The various articles we specialise in are vacuum drying and impregnating plants for armature coils, etc., vacuum drying plants for other substances, air compressors and vacuum pumps, armature testers, coil testers, air filters for turbo-generators and for air compressors, condensing apparatus, vacuum cleaners worked by steam, and "Toocam" brakes for tramways.

Daimler Company, Limited,
Coventry.

We set out hereunder the models which we manufacture with the dates of delivery against each type. Two-ton lorries within seven days from date of receipt of order; 3-ton lorries, at the moment we cannot give any actual date as to when we shall be able to deliver this model as the War Office are taking up practically the whole of our output. We are, however, receiving many orders for delivery as soon as possible after the War Office have obtained as many as they require; 4-ton lorries, approximately 10 weeks from date of order; 5-ton lorries, approximately 10 weeks from date of order.

Dennis Brothers (1913), Limited,
Onslow Works, Guildford.

Our output at present is being entirely requisitioned by the War Office, and consequently we are unable to offer for immediate delivery any new product. We have, however, some second-hand chassis, which have been used for passenger carrying this season only. They were delivered, some at Easter, and the majority at Whitsuntide, to customers who are now anxious to sell them in view of the loss of business from the war. These chassis have approximately done 3,000 and 4,000 miles, and might be useful to anyone requiring a good 3-ton chassis capable of taking a capacious body.

Though our works were closed for our annual holiday, it becomes necessary for us to make special efforts to increase our production at the expressed desire of the War Department. On Friday, August 7, we got some of our men back hurriedly, with the result that on the following Sunday we were able to despatch no less than 12 Dennis motor lorries, principally of the 3 and 4-ton types. Since then we have continued to deliver further vehicles with great rapidity, making the week's output from Friday the 7th to Friday the 14th August no less than 34 lorries completed and delivered. This will, we think, be interesting information as showing the ability of our factory to turn out under pressure, and the efforts made by the leading motor manufacturers to assist in coping with the national emergency. Our men, are, of course, working overtime, and we expect that during the coming week our output will not fall short of the number mentioned above.

Dunlop Rubber Company, Limited,
Aston, Birmingham.

The demand for our solid and pneumatic tires is exceptionally heavy, but we are in a position to meet fully all our customers' requirements.

Edison and Swan United Electric Light Company, Limited,
Ponders End, Middlesex.

Our position as regards stocks of both raw materials and finished goods is such that we are at the moment, and possibly for some time to come, in the happy position of being able to fulfil all general requirements. We have been compelled, in the interests of our regular customers, to refuse many offers of extraordinary large quantities of accessories, which are now in demand owing to the closing down of the German and other Continental markets, and it is needless to add that we shall continue to maintain this attitude in the interests of our clients. Our position as regards drawn-wire Tungsten and carbon filament lamps is absolutely unique, in that we hold large stocks of finished lamps and adequate stocks of raw materials which will enable us to cope without the slightest hitch with the large increase in the demand for *all British* (British labour, in Great Britain, with British capital) lamps. In this connection it is important to note that we are not dependent, as is the case with many so-called lamp makers, for the supply of lamp bulbs from Germany and other Continental markets, our facilities for making these in our own glasshouses at these works being more than adequate to meet and maintain the requirements of the increased trade.

The Electro-Mechanical Brake Company, Limited,
Eagle Works, West Bromwich.

We have pleasure in sending to you a list of our manufactures. The "Maley" electro-mechanical rail brake, all types of brakes to specification, magnets and shoes, unbreakable, jointless, grid type resistances, rolling stock parts, car switches, fuse boxes, trackless trolley junctions, overhead junctions, patent trolley heads and wheels, section insulators, line materials, canopy trolleys, pinions, gears, solid forged truck frames, and iron and steel forgings of every description.

The General Electric Company, Limited,
67, Queen Victoria Street, London, E.C.

After careful consideration, we have come to the conclusion that if we were to send you a list of the equipment, which we can supply at once, it would fill more than one issue of your valued journal, whereas the list of equipment which we find temporary difficulty in supplying would occupy but the fraction of a column.

We would, however, like to draw your attention to the position of the Witton Carbon Works, which occupy a unique position in this country. In this connection we enclose a letter, which we should be glad if you would give publicity to it in your columns. [The letter referred to appears on another page.]

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Equipment and Engineering Company,
2 and 3, Norfolk Street, Strand, W.C.

We have pleasure in sending you herewith list of material which we handle, and of which we can give reasonable delivery.

Overhead line material: Insulating bolts, globes, and brooklyns; porcelain strain insulators, "phono-electric" trolley wire (special condition of delivery).

Track appliances: Track jacks, hydraulic jacks, lifting jacks, permanent way tools, point controllers, rail cleaners, rail grinders, rail saws, signalling apparatus, automatic signals, tower wagons, departure clocks, pole fitting for illuminating car stopping stations, rail planes, corrugation removers, trolley bases.

Rolling stock material: Anti-friction metal, tramway axles, bells, brake blocks, brake handles, car jacks, fuses, gears and gear wheels, insulating material, lifting jacks, seat covers, linen blinds, trolley earth indicators, wheel truing brake blocks, tramcar steps, axle box packing, sand boxes and sanding devices, sand driers, trolley heads, trolley retrievers, trolley poles, trolley rope, trolley booms, destination indicators, numerical indicators, dwarf trolley bases, side life-guards, wind screens and vestibules, controller fingers, gear cases, brakes.

General Seating Company, Limited,
13, City Road, E.C.

The following is a list of the rolling stock and other specialities which we are in a position to supply promptly. Spring or stuffed seats and cushions of all descriptions covered to specification, "Carlyte" spring mattresses, woven-wire and coil-spring mattresses, stuffed mattresses of all descriptions, rattan, buffalo hides, imitation leather, vermin-proof felt, vermin-proof stuffing material, buttons, studs and bandings, upholstery and trimming materials generally, sundry furnishings, springs, blinds and curtains, interior and exterior cabinet and joinery work, mouldings, etc., "duplex" axle box packing.

In addition to these we also undertake the following: First aid outfits, "Carlyte" emergency hospital beds, folding tables, hair, felt body blocks, mirrors, and carriage fittings, such as parcel racks, straps, etc.

Glasgow Numerical Ticket and Check Book Printing Company,
31, Finnieston Street, Glasgow.

At this time when the European market for all sorts of supplies is closed, we consider your suggestion a very good one, and we append a list of our specialities. We shall be delighted to submit samples and quote prices to any likely purchaser, and can guarantee speedy delivery and high-class work: Tramway, omnibus, and railway tickets, way bills, time checks, wages slips, coupons, section tickets, discount tickets, check books, manifold books, and order books.

Hadfields, Limited,
East Hecla Works, Tinsley, Sheffield.

Hadfields, Limited, are prepared to supply castings and forgings for hydraulic engineering, locomotives, bridges, dynamos, dredgers, collieries, and quarries; crushing and mining machinery, renewals, etc. Orders for points, crossings, and special trackwork for tramways and railways will receive prompt attention. Particulars in regard to the latter may be obtained from an illustrated catalogue containing numerous illustrations showing junctions and other special work which the company have manufactured and supplied to some of the most important towns and corporations in the world. The company will be glad to send a copy of this catalogue on application.

Hurst, Nelson, and Company, Limited,
Motherwell.

We are prepared to supply either at once or within a reasonably short period all classes of railway and tramway rolling stock and spare parts therefor, including trucks, wheels and axles, etc. We are particularly well placed to cope with orders for pressed-steel work of all kinds, including underframes and bogies.

Robert Kearsley and Company, Limited,
Ripon, England.

Our factory is working full time, and we are able to give immediate delivery of all kinds of varnishes, enamels, paints, and colours, as usual.

Leyland Motors (1914), Limited,
Leyland, Lancashire.

As the War Office have commandeered all our output and work in progress, it is impossible for us to give any supplies upon short notice.

Lorain Steel Company,
36-38, New Broad Street, London, E.C.

We are obliged to you for the offer to include a list of our products, which we give as follows: Grooved and tee rails, railway and tramway points, crossings, and special work; electric bonds, all sizes and types; steel poles, tubular and lattice; trolley, feeder, and magnet wire; electrical sheets for armature and magnet cores; electric cables, wire fencing, and concrete reinforcement; all classes of tubes, wire, steel shapes, plates, etc.

Nobles and Hoare,
Cornwall Road, S.E.

We have a large and well-matured stock of varnishes specially made for railway and tramway rolling stock, fit for immediate use and ready for prompt delivery. We also manufacture enamel paints and superfine colours ready ground and in turpentine.

The Magnolia Anti-Friction Metal Company, Limited,
49, Queen Victoria Street, London, E.C.

This company is prepared to deliver "Flower" brand magnolia metal immediately on receipt of order. The company have sent to us several circulars explaining the advantages of their brand of anti-friction metal for all kinds of bearings. Instructions for using magnolia metal are given in some of the circulars, which the company will be glad to send on request.

Millars' Timber and Trading Company, Limited,
Pinner's Hall, E.C.

In reply to your inquiry of the 28th ult., we are prepared to supply Corporations and others with Jarrah blocks immediately from stock.

"M and G" Truck and Engineering Company, Limited,
St. John's House, 124 to 127 Minories, E.

Our supplies are chiefly confined to electrical rolling stock for tramcars and electric railways, and owing to the wide variety of requirements, track gauges, etc., we do not attempt to keep in stock any tramcar trucks, but are in a strong position to put any orders for these through expeditiously and can generally commence delivery of trucks within eight to ten weeks from order and settlement of details. We do, however, make it a rule to keep in stock spare parts for tramcar trucks, such as axle box journal brasses, malleable shoe holders, pilot board brakes, etc., and other parts likely to require renewals from time to time.

Pease and Partners, Limited,
Tees Iron Works, Middlesbrough.

We can supply from stock or at short notice, railway and tramway chair plates, chairs or bearing plates, tramway and railway brake blocks, collector shoes, track brakes, etc. Our foundries are being kept working at full pressure.

Peckham Truck and Engineering Company, Limited,
Queen Anne's Chambers, Westminster.

Our specialities are Peckham long wheel base tramway trucks and the supply parts for all makes of tramway trucks.

Polack Tyre and Rubber Company,
31-34, Basinghall Street, E.C.

From their works at Isleworth the company is able to supply promptly English-made solid rubber tires for all kinds of vehicles.

Railless Electric Traction Construction Company, Limited,
Finsbury Pavement House, E.C.

Our works and staff are particularly adapted to deal with "special" engineering work, electrical and otherwise, as well as to manufacture railless electric traction (overhead trolley) and battery-driven passenger cars and goods wagons, and also chassis for motor wagons and lorries, etc. Inquiries shall have our careful attention.

Railway Track Supply Company, of Great Britain,
Gracechurch Buildings, Gracechurch Street, E.C.

We have in stock, ready for immediate delivery, a number of electric accumulator industrial trucks, 2-ton capacity, similar to those supplied to a number of railway companies, etc., in this country. These, as you are aware, are very handy vehicles for conveying materials in and about workshops, warehouses, etc.; they show a great saving over hand trucking.

Scholey and Company, Limited,
151, Queen Victoria Street, London, E.C.

We are in a position to supply our tool steel gears and pinions at very short notice. The standard sizes are carried in stock, but even on special types our deliveries are not likely to be interfered with.

Ruberoid Company, Limited,
81-83, Knightrider Street, E.C.

We are manufacturers of P. and B. insulating tapes, P. and B. insulating paints, P. and B. insulating varnishes, Ruberoid roofing, Ruberoid damp-course, Ruberoid flooring. We would especially draw your attention to the fact that in the past there have been extremely large quantities of Continental manufactured insulating tapes put upon the English market, and we ourselves are now manufacturing a cheaper grade of P. and B. insulating tape, samples of which we shall be very pleased indeed to forward to any of your readers.

Walter Scott, Limited,
Leeds Steel Works, Leeds.

We are, as you are aware, makers of tramway rails and fish plates. We have stocks of certain British standard sections, and are prepared to consider offers for the supply of suitable quantities from rolls at short notice. In addition to tramway materials, we are makers of girders, channels, and flats in all the standard sizes, and carry very large stocks of these, which could be delivered promptly.

Siemens Brothers Dynamo Works, Limited,
Caxton House, Westminster, S.W.

We hold a considerable stock of standard motors for direct and alternating currents; also starters and machine accessories. We can also manufacture at short notice a very wide range of motors and generators for direct or alternating currents, also tramway motors, switchgear of all classes, and transformers.

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The Skefko Ball Bearing Company, Limited,
Skefko Works, Luton.

The catalogue of this company for 1914 contains particulars of the whole of the material which they supply, including bearings for factory and electrical equipment, automobiles, adapter bearings, single and double thrust and line shafting bearings, and ball bearing hubs.

Smethwick Manufacturing Company,
Bridge Street, Smethwick.

Our speciality is drop forgings, which are used by rolling stock builders, trackwork suppliers, electrical equipment suppliers, tramway companies, etc. The first two sections of our catalogue will give some idea of the range of our supplies. The section applicable to light railway and tramway work is at present in course of preparation, and will be sent on application.

Stewarts and Lloyds, Limited,
41, Oswald Street, Glasgow.

We make and supply the following tubular steel materials: Overhead line materials—traction poles; transmission towers. Rolling stock—trolley poles. Generating stations—main steam pipes; penstocks; electric installations; boiler tubes; iron and steel tubes and fittings.

John Taylor,
7, Strand Street, Liverpool.

I am in a position to supply in quantities, and very promptly, Taylor's patent tubular sanding devices, also galvanised iron sand boxes. I specialise in the two articles, and trust through your valued paper business will result to our mutual advantage.

Titan Trackwork Company, Limited,
Rutland Works, Rutland Road, Sheffield.

We have pleasure in giving you the following list of our manufactures and equipments which we could supply at short notice: Manganese steel points and crossings for electric tramways, special tramway lay-outs in manganese steel, tramway rails, curved and straight, in manganese steel, car depot lay-outs in manganese steel, cross-overs and loops in manganese steel, fish plates for tramway track, fish bolts for tramway track, tie bars for tramway track, tramway and railway level crossings in manganese steel, cast-steel and cast-iron drain boxes, contractors' tools of every description.

Tramway Supplies, Limited,
160, Woodhouse Lane, Leeds.

We append a list of tramway fittings and overhead line material that we keep in stock or can manufacture at very short notice. Up to the present we have been able to keep the whole of our works and staff on full time, but can only keep on doing this by being supported by our tramway customers. We are naturally anxious that we should be able to keep the whole of our employees on full time, and we should like to take this opportunity of asking our friends to support us in this endeavour. We have in stock, or in course of manufacture, the following specialities and fittings: Turner's patent automatic point controllers, automatic electric signals, electric indicators, head lamps, controller fittings, frogs, crossings, section insulators, ears, straight line hangers, double and single curve hangers, car fittings, general fittings used in the construction of overhead electric tramways.

Tudor Accumulator Company, Limited,
3, Central Buildings, Matthew Parker Street, Westminster.

The electrical plant we supply is confined to accumulators. These are manufactured in various types for traction and stationary purposes.

Tyne Metal Company, Limited,
Skinnerburn Road, Newcastle-on-Tyne.

All our supplies are of "Tyne Metal," and we can deliver the following from stock or at short notice: Brake blocks (for railways and tramways), patent self-oiling conveyance rollers (now used for mine sweeping) for wire ropes; bucket ladder rollers and angular fairlead rollers (for dredgers), warping ends (for winches). Tyne metal is suitable for any work where heavy wear is to be resisted, and clients may depend upon our doing our utmost to meet their requirements.

United Electric Car Company, Limited,
Preston, Lancashire.

As you are aware, we are manufacturers of car bodies and trucks for steam and electric railways and tramways and light railways, motor omnibus bodies, and chars-a-bancs. We are in a position to supply from stock or upon short notice all kinds of spare material for car bodies and trucks. As we have a very large stock of thoroughly seasoned timber, we can execute orders promptly for staircases, canopy rims, pillars, etc. In particular we make a speciality of car seats of all descriptions, and car blinds, either complete or the material or fittings only. In reference to trucks, we not only supply the standard types of 4-wheel and maximum-traction trucks, but also the Preston patent flexible-axle spring-yoke truck. We also include amongst our specialities the Preston patent destination indicator, for top-seat and single-deck cars, the Preston patent slipper brake, and the Anger wear-gathering silent brake hanger.

C. A. Vandervell and Company,
Warple Way, Acton Vale, London, W.

We are glad to say that we can give our usual prompt delivery of practically all the components and accessories listed by us. For instance, we were called up at 11 o'clock by the War Office and were given instructions to execute immediately an order for C.A.V. lighting components and accessories, amounting to nearly £1,000. This order was executed before three o'clock the same day. The various components and accessories were for the Mechanical Transport Department mobilised at Kensington Gardens, and included 60 pairs of head lamps, a mile of armoured cable, a large number of bulbs and complete sets of spare lamps complete for no fewer than 200 of the cars which had been commandeered.

Watlington and Company, Limited,
48, Milton Street, London, E.C.

We enclose a list herewith of material that we supply and are in a position to give prompt delivery: Compressors, American vulcanised fibre, anvils and vices, asbestos goods, ball bearings, bells, bolts, nuts, rivets, screws, etc., bonds (rail), brackets, brake indicators, bushes (trolley), cables, carbon brushes, car jacks, circuit breakers, contractors' tools, destination indicators, ebonite, electric light fittings, electrical tubes, fuses, gear cases, gears, grinding machines, hoisting appliances, hydraulic wheel presses, insulating material, insulators, lamps (electric), lamps (hurricane and road), lattice steel poles, lock nuts, machine tools, motors, overhead equipment, overhead line tools, paint, varnish, enamel, etc., poles (steel), pulley blocks, punches (ticket), rail benders, rail saws, rail cars, railless electric system, rubber tape, sand boxes, sand dryers, signalling apparatus, springs, switchboards, tool and chisel steel, tower wagons, track cleaners, tramcar fittings, tramway specialities, trolley bases, trolley cord, trolley heads, trolley standards, trolley wheels, trolley wire, trucks for cars.

Alfred Williamson,
North Mill Printing Works, Ashton-under-Lyne.

My speciality is tickets for railways, tramways, motor omnibuses, etc., as follows: Tickets in rolls, books, or packets of every description for railways, tramways, motor omnibuses, etc; registering ticket bell punches. Prompt delivery can be given in all cases.

S. Wolf and Company,
115, Southwark Street, London, S.E.

We agree with you that the information you propose publishing in your next issue will be of service to your foreign and Colonial readers. We can supply the undermentioned from stock or at very short notice: Solex carburettors, electric drilling machines, and electric grinding machines, S.R.C. ball bearings.

THE BRITISH ENGINEERS' ASSOCIATION.

The second edition has just been issued of the official directory of members (with a classified list of their manufactures) of the British Engineers' Association, whose offices are at 32, Victoria Street, Westminster, London. The first edition of this book was not sent to the Press, owing to the fact that it is difficult to make so comprehensive a book accurate in the first instance. This is accordingly the first all-British manufacturing engineering directory. The combined capital of the firms in the Association amounts to about £100,000,000, and the members cover the whole range of engineering plant and accessories. The Association accordingly claims to be in a position to find a British manufacturer for every engineering requirement. The Association is paying particular attention to markets in China for engineering work, and has a commissioner there who sends home reports. In various ways the members are helped to get orders and contracts, and the Association has established cordial relations with the Foreign Office. Another advantage is that membership of the Association carries with it the immediate and practical support of British Consular officers. As many contracts abroad can only be obtained by a system of long credit, the Association is creating a financial trust, which will enable members to receive cash on delivery from the trust, instead of waiting for the purchasers' deferred payments. The securing of fair conditions of contract is also a matter that receives attention.

The official directory of the members is designed to assist purchasers of engineering plant by giving them the names and specialities of *bona fide* British manufacturers. It is accordingly claimed that the fact that a firm's name appears in the book is a guarantee of its standing as a British manufacturing concern. The directory has been submitted to the Foreign Office, and is being issued to all British Embassies, Legations, and Consulates and to all the British Trade Commissioners attached to our colonies and dependencies. It has also been lodged with the Commercial Intelligence Department of the Board of Trade for reference. The president of the Council of the Association is Mr. Douglas Vickers, and the vice-presidents are Mr. T. O. Callender, Sir R. A. Hadfield, Mr. Herbert Marshall, Sir William Mather, and Sir J. I. Thornycroft. Many of the largest engineering firms in the country are represented on the Council, and the secretary is Mr. Stafford Ransome, M.Inst.C.E.

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TRAMWAY MEN WITH THE COLOURS.

Tramway employees have made a gratifying response to the call of the nation in these critical days. Almost every undertaking is represented in the service, and in some cases by a substantial proportion of the staff. By the courtesy of the managers of tramways throughout the country we append a statement from most of these undertakings giving the number of employees who had left to join the forces up to the end of August. Since that time the numbers have no doubt been augmented, and we hope that still more will follow the example of their comrades who have already responded to the nation's need. In a struggle so inevitable and so essential to the national honour and safety, no man who is not imperatively prevented from taking his part should be willing to stand aside while his colleagues offer themselves for the defence of King and country.

As will be seen from the notes appended, both Corporations and companies are doing their part to encourage their men. Generous arrangements are being made in regard to allowances to their dependents, and on return all men will, of course, be able to resume their positions. Under these circumstances the men will be able to accept service with the colours with full confidence that those who may be dependent upon them will not be neglected, and that they themselves, be the war long or short, will at its end be able at once to resume their civil occupation without delay or inconvenience.

Aberdeen Corporation Tramways.

Seven motormen, 11 conductors, and 16 other employees have been called to the colours from the Aberdeen Corporation Tramways. On August 17 the Corporation decided to pay to the wives and dependents of employees called up the difference between the pay they receive from the Army and Navy and the pay they were receiving from the Corporation.—R. STUART PILCHER, general manager.

Accrington Corporation Tramways.

Six of our men have joined the colours, including two drivers, two conductors, and two other employees. Half wages are being paid to dependents of the men, and their positions will be kept open until their return.—H. PILLING, general manager.

Ayr Corporation Tramways.

Seven of our men have joined the colours. The Corporation have decided to make up the difference between the allowance granted by the Government to their actual wage before leaving to join their respective regiments.—W. GRANT, general manager.

Barnsley and District Electric Traction Company.

Seven drivers and one other employee have been called up. The conditions granted to these men are as follows: 8s. per week for the wife, and 1s. per week for each child. Each employee is contributing weekly from his wages or salary sums varying from 2d. to 2s. 6d. The directors contribute an equal amount, and grants out of the fund are made weekly on the recommendation of a local committee of the employees.—P. H. MARCO, general manager.

Birkenhead Corporation Tramways.

Sixteen employees have joined the colours from the tramways department, including four drivers, seven conductors, and five other employees. The Corporation have decided to make up the wages of all employees who have joined the colours to an average weekly wage, less the allowance made by the Government. Arrangements have been made whereby the dependents may obtain the money weekly from the borough treasurer's department. Several members of the staff have been enrolled as special constables to protect the gas, water, electricity, and other departments from 6 p.m. to 6 a.m. The salaried staff have agreed to contribute monthly for 12 months 2½ per cent. of their salaries towards the National Relief Fund, and a weekly collection is being made from all the other employees of the department towards the same fund.—C. CLARKE, tramways manager.

Birmingham and Midland Tramways Joint Committee.

Birmingham District Power and Traction Company, Dudley, Stourbridge, and District Electric Traction Company, South Staffordshire Tramways (Lessee) Company, Wolverhampton District Electric Tramways.

Thirty-two men have joined the colours from the four tramway companies controlled by the above committee, viz., 5 drivers, 19 conductors, and 8 other employees. All the dependents of employees who have been called up are being dealt with in connection with the B.E.F. Mutual Aid Fund.—W. G. BOND, general manager.

Belfast City Tramways.

This tramway undertaking has lost between 40 and 50 of its staff, who were called up to join the colours. Many others would have been withdrawn from the service had it not been for the fact that between 200 and 300 of them belong to the Ulster Volunteer Force, and they appear to have considered it inadvisable to leave Ulster until it was quite certain that no surprise would be sprung upon them with regard to Home Rule. It must not be forgotten that a great deal of money and time has been spent upon the two years' training, for the purpose of making them the highly trained soldiers they are.

The Corporation have decided that half the wages of all men, whether Reservists or Volunteers, who join the Army or Navy, shall be paid to their dependents, and that they shall be guaranteed the position they held, at the same seniority, if and when they return. With regard to the Prince of Wales' National Relief Fund, the whole staff have contributed according to a system: the general manager 10 per cent. of his salary; all other officers and foremen 5 per cent. of their salaries or wages, as the case may be; and all other employees 3d. per week. Should the necessity arise for reduction of expenses, it is decided that this will be carried out by a reduction of hours, without the suspension or dismissal of a single unit of the staff.—ANDREW NANCE, general manager.

Bexley District Council Electricity and Tramways Department.

Eighteen of the regular employees of this department have been called up, and in addition to this a number of extra men who were engaged on permanent way repairs. The Council agreed on August 7 to pay half wages to the wives or dependents of all men engaged in the service at the time of being called up, and also to re-engage them upon their return.—H. P. STOKES, electrical engineer and tramways manager.

Birmingham Corporation Tramways.

Between 400 and 500 employees of the Birmingham Corporation tramways department have been called to the colours. The Corporation on August 20 decided to pay the dependents of these men as follows: To the wives of men in the receipt of not more than 26s. per week an allowance of 8s. a week each, with 1s. per week for each child, and in addition to the families of those men whose wages exceeded 26s. per week an allowance of 50 per cent. of the amount above that sum. Thus, if a man's wages amounted to 30s. per week his wife will receive 8s. in respect of 26s., and in addition one half of the balance of 4s., and so on, in proportion to the wages or salaries above 26s. If a man has no wife, but relatives solely dependent on him, then the allowance will be one and a half times the amount the Corporation would have given to the wife. This sum has been granted because the dependents, unlike the wives and families, will receive no Government grant. The tramway men have requested the management to deduct 3d. per week from their wages, the amount so deducted to be paid over to the Prince of Wales' National Relief Fund. It is expected that this will produce at least £25 per week.—A. BAKER, general manager.

Blackburn Corporation Tramways.

Twenty-five employees from this department have joined the colours, including 11 drivers, five conductors, and nine other employees. It has been decided that in the cases of wives of Corporation employees called up for service in the Navy, Army, or Territorial Forces the amount of their separation allowances, together with half the service pay of the man called up, be made up to three-fourths of his present pay, with a minimum of 20s., provided that where there are no children, the amount be 5s. per week less than the above with a minimum of 15s. The cases of unmarried men is still under consideration.—J. H. COWELL, general manager.

Bournemouth Corporation Tramways.

The following employees of the Bournemouth Corporation Tramways have joined the colours: 15 drivers, 29 conductors, and 20 other employees. With regard to the conditions granted to these employees and their dependents, half-pay will be given to them as a temporary measure.—I. BULFIN, general manager.

Bradford City Tramways.

The following employees have been called up for service: 23 drivers, 44 conductors, 27 other employees, making a total of 94.

The Corporation have decided to pay the dependents of these men as follows: To those men's wives who have children the full wages are paid, less the amount of separation allowance and allotment pay, and 7s. for the approximate cost of the man's food, of which the home is relieved during his absence. To those wives with no children, after receiving Government allowance and allotment pay, the Corporation make the amount up to £1 (one pound) per week. To single men with dependents each case is judged on its merits, and where necessary, amounts granted to bring up the income to £1 (one pound) per week. Officials with salaries of £250 (two hundred and fifty pounds) or more are voluntarily giving 5 per cent. of their salaries to the Lord Mayor's Relief Fund. Other officials with salaries and wages less than £250 per annum have promised 2½ per cent. of their salaries to the same fund.—C. J. SPENCER, general manager.

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Brighton Corporation Tramways.

Forty-one of our men have been called up to date, including 13 motormen, 13 conductors, and 15 of other grades. The actual amount of relief to be paid to their dependents has not been finally settled, but so far as present arrangements go the wives of married men will receive half their husbands' earnings, and the dependents of single men will receive an allowance to be settled in each individual case, in proportion to the extent which they contributed to the support of those in question. Although only 41 have actually left up to the present, I understand that this number will be increased, as a number more are enlisting.—WILLIAM MARSH, engineer and manager.

Bristol Tramways and Carriage Company.

About 300 of the employees from all departments, and including the branches as well as Bristol, have joined the colours, a large number being reservists and others new recruits. In addition, there are 74 Red Cross men who have volunteered to do duty in Bristol, 17 of whom are already employed regularly at the Military Base Hospital, which is the Bristol Royal Infirmary. The directors are allowing weekly to the wives of all married men half wages and 1s. for each child under 14 years of age. To dependents of single men, in cases where it is proved that they are deprived of necessary assistance, an allowance is made in all such cases, the amount varying according to circumstances. —CHAS. CHALLENGER, manager.

The British Electrical Federation, Limited.

About 850 employees of the federated companies have joined the colours. To assist the dependents of about 400 of the above employees, the B.E.F. Mutual Aid Fund has been established by the federated companies. It provides for the companies subscribing an amount equal to the total contributions made by the employees who remain at work. The contributions of the companies will not be less than 3d. per week in respect of every man in their employment. The dependents of the other 450 employees, who are connected with the federated companies in the metropolitan area, are being looked after by the "T.O.T." Mutual Aid Fund.

The men who have been called out have been given to understand that their places will be kept open for them upon their return. In the event of a reduction of services becoming necessary, the companies will endeavour, by equalising the work as much as possible, to avoid reduction of staff.—C. F. JAMES, secretary to the executive committee.

Burnley Corporation Tramways.

The following men have been called up to the colours: 10 drivers, 20 conductors, and seven other employees, a total of 37. The conditions granted to the dependents of the men called to the colours are 75 per cent. of the nominal wages to be made up, *i.e.*, the allowances to the soldier, his wife and children, or dependents are ascertained, and the amount made up to 75 per cent of the nominal wage.—HENRY MOZLEY, general manager.

Bury Corporation Tramways.

The number of tramway employees who have joined the colours is 15, including seven drivers, four conductors, and four other employees. The Corporation has decided that these men are not to suffer any loss of wages or position, and that the difference between their pay whilst with the colours and their average weekly wage is to be made good.—WILLIAM CLOUGH, general manager.

Cardiff Corporation Tramways.

The following employees from the Cardiff Corporation tramways department have been called up to join the colours: 25 drivers, 18 conductors, six cleaners, one man from overhead equipment department, and four men from the repair shops department. All these men will have their positions kept open for them pending their return after the conclusion of the war, and during their absence the Corporation have undertaken to pay to their dependents or others nominated by themselves a sum of money each week which, with the amount they receive as Government pay, will make up their full weekly wage of 54 hours.—ARTHUR ELLIS, manager.

Chatham and District Light Railways Company.

The following men have been called up or have volunteered: 23 motormen, 22 conductors, and six other employees. The directors have granted the following gratuities: To all married men, or men with dependents, the sum of 10s. per week, and in addition 1s. per week for each child. To the single men without dependents, 10s. per week will be put aside, and on their return, if disabled, their accumulated portion will be paid them.—W. JENSEN, general manager.

Cheltenham and District Light Railway Company.

Seven of our men have gone to the front, including three motormen, three conductors, and one shedman. The directors have instructed me to pay the wives of these men 7s. per week, and 2s. per week for each child.—H. J. MCCORMICK, general manager.

Chester Corporation Tramways.

Six conductors in the Chester Corporation tramways department have joined the colours. In the case of the married men only it has been decided to allow their wives the difference betwen the Government grant and the amount of their average wages.—JOHN GARDNER, manager.

City of Gloucester Light Railways.

The mobilisation of the military forces has removed 10 men temporarily from the service of the light railways department, while a further seven National Reserve men have reported for service and may be called up. The details of the arrangements provided for the dependents of such men have not been finally arranged, but the general principle has been adopted that the measures taken shall ensure that the families and dependents shall not suffer pecuniarily while the men are away on service. Pending final adjustment, the dependents are receiving half the ordinary wages of the men. The positions of all men called up are regarded as only temporarily vacant, and are filled only until such time as the regular occupants shall again be able to resume them.—F. H. CORSON, general manager and engineer.

Colchester Corporation Tramways.

Eleven of our men have gone to the front. Of these, three are drivers, five are conductors, and three are shed hands or fitters. The Tramways Committee have decided to pay half wages to the wives of all men who have joined the colours.—R. C. BULLOUGH, general manager and engineer.

Colne Corporation Tramways.

Five men have joined the colours. In regard to the grants to be given to the dependents of the men, our Council passed a resolution on August 26 that the wife of each man serving in the forces should have an allowance of 5s. per week, and 2s. for every child.—T. G. RICHARDSON, general manager.

Coventry Corporation Tramways.

Thirteen men from the tramways department of the Coventry Corporation have joined the colours, including five drivers, five conductors, and three other employees. The City Council have adopted the following recommendation of the General Purposes Committee: "That the position of every officer and servant of the Corporation who goes on active service be kept open until his return. That, during his absence, a minimum payment of 10s. per week be made to the wife or principal direct dependent of each such officer, with an addition of 1s. per week for each child under the age of 16 years, and that it be left to the discretion of the various committees concerned to make payments in excess of this minimum if, in their opinion, the circumstances warrant it."—T. R. WHITEHEAD, general manager.

Croydon Corporation Tramways.

About 40 employees in this department, representing Army and Navy reservists, together with Territorials, are now serving with the colours. Ten are motormen, 24 conductors, and other grades. The Croydon Council are granting allowances to men called up on the following basis: Married men, half average wages (minimum 15s., maximum 40s. per week); single men with dependents, cases dealt with on merit. Tramway employees under this heading are receiving half average wages.—T. B. GOODYER, general manager.

Darlington Corporation Tramways.

Ten of our conductors have joined the colours, and this represents the whole of the men who have joined from our tramways department. Temporary arrangements have been made for the relief of the dependents of these men, and it will be definitely decided shortly what conditions are to be granted.—J. R. P. LUNN, engineer and manager.

Derby Corporation Tramways.

Sixteen employees in this department have been called to the colours, including six motormen, eight conductors, and two other employees. The Corporation on August 21 decided that an amount equal to the War Office separation allowance be paid to the dependents of married men, and 10s. per week be paid to the dependents of unmarried men, such allowance to commence from the date the ordinary pay ceased and to be paid for one month, when the question will be reconsidered. The employees in the tramways department have given their consent for a deduction of one penny per week from their wages for the benefit of the National Relief Fund.—F. HARDING, manager.

Doncaster Corporation Tramways.

Eight employees of the tramways department have joined the colours. The Corporation will pay the dependents of these men half their average weekly wages.—E. S. RAYNER, borough electrical engineer and tramways manager.

Dublin United Tramways Company.

The list of our men who have been called up on active service includes three drivers, two conductors, and 18 men belonging to the shops, power house, and labourers. The question as to the conditions granted to these employees and their dependents is under the consideration of the directors.—C. W. GORDON, manager.

Dumbarton Burgh and County Tramways Company, Limited.

So far only three of our motormen have left for active service. The conditions granted to these men and their dependents are as follows: The directors have resolved that in the case of employees of the company being called up for service or voluntarily joining the army, an allowance be made, in the case of married men, of 7s. a week to the wives, and 2s. each child under 14.—J. P. MCMAHON, engineer and manager.

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Dover Corporation Tramways.

One-third of our staff have joined the colours, including seven drivers, 12 conductors, and two others, a total of 21. Married men are to be paid full average wages, and single men three-quarter average wages, less in each case military pay, etc.—EDWARD CARDEN, general manager.

Dunfermline and District Tramways Company.

Up to the present the number of our employees who have joined the colours are four motormen, four conductors, and three other employees. With regard to the conditions granted to these employees and their dependents, my company have not fixed anything definite, although the cases of dependents will receive their attention.—JAMES H. SHEPHERD, engineer and manager.

East Ham Corporation Electric Lighting and Tramways Department.

Up to the present the following employees have been called to the colours: 10 motormen, four conductors, and 18 other employees. Owing to the Council being in recess, nothing definite has been arranged as regards pay, etc., but in the meantime these employees are receiving half-pay.—W. C. ULLMANN, engineer and manager.

Erith Electricity Supply and Tramways Department.

One driver, two conductors, and eight other employees have been called up to join the colours. We are at present allowing half-pay to the dependents of each.—A. COVENEY, engineer and manager.

The Gateshead and District Tramways Company.

Thirteen employees of the company have been called to the colours. The men who have been called out have been given to understand that their places will be kept open for them upon their return. In the event of a reduction of services becoming necessary, the company will endeavour, by equalising the work as much as possible, to avoid reduction of staff.

The British Electrical Federation Mutual Aid Fund, for the relief of dependents of tramway and electric supply men who are called on service, has been established by about 40 of the federated tramway and electrical companies, of which this company is one. It provides for the companies subscribing an amount equal to the total contributions made by the employees who remain at work. The contributions of the companies will not be less than 3d. per week in respect to every man in their employment.—C. W. FRANCIS, assistant secretary.

Glasgow Corporation Tramways.

The number of the employees of the Glasgow Corporation tramways department who have joined the colours is 614, including 517 motormen and conductors and 97 other employees. A special committee of the Corporation have been considering the question of what allowance should be given to the wives and dependents of these men. This committtee have agreed to recommend to the Corporation that a wife should receive such a sum as with the separation allowance will be equal to two-thirds of the husband's wage. That is to say, if a man has 30s. a week, the wife will be assured of an income of 20s. per week. In addition to this, if she has a family she will receive 1s. 2d. from the Government for each child. In the case of unmarried men without dependents, the committee recommend that these men get an allowance of one-third of their weekly wage. The dependents of unmarried men will be separately dealt with. The case of an unmarried man supporting his mother will probably be treated in the same way as a married man. The staff of the department have agreed to contribute to the Prince of Wales' Relief Fund a sum of £3,100 to be spread over six months.—JAS. DALRYMPLE, general manager.

Great Grimsby Street Tramways Company.

Only very few of the employees of the Great Grimsby Street Tramways Company have so far joined the colours. The directors have granted to these employees and their dependents a weekly payment of 12s. 6d.—H. L. WHITE, manager.

Great Yarmouth Corporation Tramways.

The following men have left us to join the colours: Two drivers, nine conductors, and three other employees, making a total of 14. The following resolution adopted by the Town Council at its last meeting is being acted upon: "Any officer or servant of the Council who is a member of the Territorial or other reserve force, naval or military, of the Crown, who may be mobilised or embodied owing to the European crisis, should be granted leave of absence, and be reinstated on return without any loss of position or emoluments consequent thereon. In his enforced absence the Council shall pay him or such other person or persons as he may appoint during such period, such sums as with the pay received from Government will make up his full salary or wages, and the respective committees be authorised to make such necessary arrangements to carry on the work of such officers or servants in their service."—F. L. TURNER, general manager.

Hampshire Light Railways Company.

(Gosport and Fareham Tramways, Gosport and Alverstoke Electric Lighting Company, Limited, Portsdown and Horndean Light Railway.)

My directors decided to pay the wives of any of our men called to the colours half-pay (not to exceed 12s. 6d. per week) during the time the men are absent, and at the same time to reinstate such men on their return. Eight men have now joined the colours.—J. FEREDAY GLENN, engineer and manager.

Halifax Corporation Tramways.

Thirty-four employees have joined the colours, including eight drivers, 22 conductors, and four other employees. The Corporation have decided to pay 5s. per week to the wife or relative solely dependent, and 2s. for each child under 15 years of age.—JAS. D. CAIRD, traffic manager.

Huddersfield Corporation Tramways.

Thirty-six of our employees are absent on military and naval duty, including six motormen, 19 conductors, and 11 other employees. The conditions granted to these employees and their dependents are as follow: In respect of a married man with dependents, 8s. per week to his wife and 2s. per week for each child under 15 years of age, subject to the proviso that no weekly allowance shall exceed 25s.; in respect of an unmarried man, or widower without children, 8s. to his parents, if he has made regular contributions towards their maintenance; in respect of a widower with children under 15 years of age, 8s. per week for the first child, and 2s. per week for every other child under that age; such allowances to be retrospective. The situations of the men will be kept open for them, and should any man be killed whilst on service, the allowance applicable to the case will be continued until the Government have dealt with the claims of the dependents. The above provisions will apply to the permanent employees of the Council. The question as to whether a man's service is casual or not to be decided by the head of his department.—R. H. WILKINSON, general manager.

Hull Corporation Tramways.

Forty-three of our men have joined the colours, including 12 motormen, 27 conductors, three car washers, and one point boy. For the first fortnight the Corporation authorised the payment to the dependents of these men of 12s. per week and 2s. for each child under 15. This was done in order to keep the homes going. Now, however, it has been settled that each man shall have his wages paid in full while on active service, less such money as may be paid to him and his wife, etc., by the military or naval authorities.—W. J. MCCOMBE, tramway manager.

Ilford Urban District Council Tramways.

Nine men have been called up. The Council have agreed to make up the money to the full wages, *i.e.*, they will make a contribution which added to the allowance from the Government makes full money to the wife or dependents.—L. E. HARVEY, manager and engineer.

Ipswich Corporation Electric Supply and Tramways.

Up to August 26, 35 men from the electric supply and tramway departments had been called to the colours, including three motormen, 14 conductors, one car cleaner, and 17 other employees. The Corporation has decided to pay the dependents of these men as follows: To the dependents of men in receipt of not more than 25s. per week an allowance of 5s. per week; to those men receiving more than 25s. per week, a payment of 5s. per week plus half the difference between 25s. and the actual wage received. The above refers to married men having a wife and child or children. Single men without dependents will receive an allowance of 2s. 6d. per week, which will be paid them in a lump sum when they return.—FRANK AYTON, chief engineer and manager.

Isle of Thanet Electric Tramways and Lighting Company, Limited.

Thirty of our employees have joined the colours, including five drivers, 15 conductors, and 10 other employees. The men have been promised reinstatement on their discharge.—J. A. FORDE, engineer and manager.

Leeds City Tramways.

A total of 149 men have been called up, namely, 25 drivers, 95 conductors, and 29 other employees, including eight officials. The allowance to employees while on active service, in addition to their service pay, is as follows: To single men with dependents, 5s. per week; to the wives of married men 5s. per week and for each child under 15 years of age 2s. per week. With regard to those who are classed as officials half-pay is granted while on active service. The Corporation have undertaken to reinstate all employees going on active service on their return.

The employees and officials of the department have undertaken to contribute a sum towards the local branch of the Prince of Wales' War Relief Fund according to the following scale. Under 15s. per week, 1d.; 15s. and under 25s., 2d.; 25s. and under 30s., 4d.; 30s. and under 40s., 6d.; 40s. and under 50s., 9d.; 50s. and under 60s., 1s.; beyond 60s. and up to £250 per annum, 2½ per cent.; and so on up to 5 per cent.—J. B. HAMILTON, general manager.

London County Council Tramways.

The following employees have been called up for service with either the naval or military forces: 214 drivers, 161 conductors, 432 other employees, a total of 807. With regard to the conditions granted to these employees, no definite resolution has yet been passed by the Council, but in the meantime half-pay has been granted to all men who have been or may be called up on active service, or who are married or have dependent relatives. All officers or employees who have been called up will be reinstated at the conclusion of the war without loss of seniority.—A. L. C. FELL, chief officer.

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Leicester Corporation Tramways.

Between 60 and 70 of our motormen and conductors, and 13 other employees have gone to the war. With regard to allowances, at present the committee have decided to make the men's money up to the average wage. We are organising a weekly collection from all employees towards the National Relief Fund.—A. F. LUCAS, manager.

Leith Corporation Tramways.

Six of our men have joined the colours. It has been agreed by the Tramways Committee to grant to the employees of this department allowances equal in amount to their respective wages, but subject to deduction of any separation or other allowances paid out of naval or military funds.—F. A. FITZPAYNE, general manager.

Leyton District Council Tramways.

Fifty-six employees of the Leyton Council tramways department have joined the colours, including 17 drivers, 22 conductors, and 17 other employees. The Council passed the following resolution on August 13: "That any officer or servant of the Council who, as a member of the Territorial or other Reserve Forces (naval, military, or civil) of the Crown, has or may volunteer for service, or be affected by the mobilisation or embodiment consequent on the present European crisis, be allowed leave of absence during such service; that he be reinstated upon his return, with no loss of position or emoluments consequent on his enforced absence, and that the Council pay him (or such person or persons as he may appoint) during such period, such sums, as with the pay he receives from the Government, will make up his full salary or wages.—F. SCHOFIELD, tramways manager.

Liverpool Corporation Tramways.

Over 400 of our men have joined the various forces; of these about 70 are drivers, and 200 are conductors. The remainder are skilled mechanics, shed assistants, labourers, etc. Each employee will, of course, be reinstated on return, without loss of position or emoluments. The Corporation has also decided to pay the difference between whatever the men receive from the Government and their ordinary pay.—C. W. MALLINS, general manager.

Lowestoft Corporation Tramways.

The number of employees from Lowestoft Corporation Tramways who have been called to the colours amounts to 13, including one inspector, four motormen, three conductors, and five other employees. The Corporation has decided to pay the following allowances: One-third of wages, plus 1s. 6d. per week in respect of each child.—H. H. SAUNDERS, general manager.

Manchester Corporation Tramways.

Three hundred and eighty of the employees of the tramways department have joined the colours, viz.: 91 drivers, 109 conductors, and 180 other employees. The Corporation have granted half-pay to all Naval Reserve men, Army Reserve men, and members of the Territorial Force in their employ during such period as they are absent from work owing to their being called away to fulfil naval or military duties. In addition, a number of men have volunteered for service, and the Tramways Committee have decided, where these men leave wives or dependents, they are to be allowed half wages. All officials on the staff, without exception, are subscribing to the National Relief Fund, and about 95 per cent. of the employees have signified their willingness to contribute, and have given authority for their contributions to be deducted from their wages. It is anticipated that the contributions of the tramways department to the fund will amount to over £100 a week.—J. M. MCELROY, general manager.

Newcastle Corporation Tramways.

The following employees of this department have joined the colours: 53 motormen, 37 conductors, and 21 of other grades, a total of 111. The Tramways Committee have decided to grant half-pay to the wives and dependents of these men. All of the tramways employees in this department are also subscribing sums varying from 3d. to 6d. towards the local Lord Mayor's fund for the relief of distress caused through the war.—ERNEST HATTON, engineer and general manager.

Northampton Corporation Tramways.

Eight conductors and two labourers have joined the colours. The Council have obtained particulars of all the Corporation employees who have left to join their regiments, and arrangements for making provision for the dependents of these men is receiving the Council's consideration.—J. GOTTSCHALK, general manager.

Nottingham Corporation Tramways.

Up to the present time 59 of our employees have joined the colours. On August 24 the Corporation decided, "That in the case of all employees called to join the colours, the same allowance be granted as that made by the War Department, to the wife and children of each such employee; and that in the cases of widowed mothers of such employees they be dealt with in the same way as the wives. In the case of members of the staffs of the various departments who have been called, or may be called to, or join the colours, each committee be authorised to deal with them in such way as they deem desirable." It is also proposed that the Tramways Committee shall pay the weekly contributions to the Friendly Societies of which the men who are called up are members.—JOHN ALDWORTH, general manager.

Norwich Electric Tramways Company.

Twenty-three of our men have joined the colours, including two drivers, 18 conductors, two greasers, and one fitter. The situations of these men are temporarily filled during their absence on service, and their wives each receive an allowance of 10s. per week, as do also the families of unmarried men when such families are wholly or partly dependent on them.—F. W. KETLEY, general manager.

Oldham Corporation Tramways.

Between 50 and 60 men of the Oldham Corporation tramways department have been called to the colours. The total number of men liable to be called upon is about 80. The Tramways Committee have decided to keep open all situations for men called up. It has also been decided that the wives of married men shall receive half of the wages due to their husbands, had they been working. The dependents of single men are dealt with separately, but upon similar lines. The employees of the department have adopted a scale of weekly payments (to be stopped from their wages) towards the Prince of Wales' National Relief Fund on the following basis: That men in receipt of £1 to 30s. per week pay 2d. per week; 30s. to 35s. per week, 3d. per week; 35s. to £2 per week, 4d.; and over £2, 6d. per week.—J. W. DUGDALE, general manager.

Pontypridd Electric Light and Tramway Company.

Ten employees have been called up for service. My Council decided at their last meeting that all employees, with dependents, will be paid each week, while on service, the difference between what they are paid by the Government and that earned whilst employed by the Council.—J. E. TEASDEL, engineer and manager.

Portsmouth Corporation Tramways.

The number of our employees that have been called up to rejoin the colours is as under: Six motormen, 38 conductors, and 10 other employees. My committee have decided that the dependents shall receive each week during the absence of the men the difference between their full service pay and their full tramway pay.—W. R. SPAVEN, general manager.

The Potteries Electric Traction Company, Limited.

Forty-three of this company's employees in all have joined the colours, comprising three drivers, 21 conductors, and 19 other employees. The conditions granted to these employees are that on their return they shall be restored to their original positions, and respecting their dependents, this company, together with the other companies with which it is associated, has inaugurated a Mutual Aid Fund for the support of the dependents of men who have joined the colours. The employees are contributing weekly sums to this fund, and the directors are contributing a weekly amount of not less than the total amount subscribed by the employees.—W. THOM, general manager.

Preston Corporation Tramways.

Thirteen men belonging to the staff of the Preston Corporation Tramways have joined the colours, including five drivers, three conductors, and five other employees. The Corporation at a special meeting decided that any of the officers or servants of the Corporation who are engaged in military service shall be reinstated on their return, and that the wages of the married officers or servants be paid, subject to a deduction equal to their pay and allowance from the Government. In respect of single men with dependents it was decided that a weekly allowance of 5s. be granted.—J. F. SIMPSON, engineer and manager.

Reading Corporation Tramways.

Four drivers, five conductors, and six other employees of the Reading Corporation tramways department have been called to the colours, or have enlisted. The Corporation have decided to pay the wives of all married men, whether reservists, territorials, or recruits, half the wages paid to the employees before war was declared, in addition to Government grants. In cases where unmarried men have relatives dependent on them, the same allowance is being made.—G. F. CRAVEN, general manager and engineer.

Rhondda Tramways Company.

Twelve employees have joined the colours, including the following: Three drivers, six conductors, and three other employees. Nothing has yet been done in the direction of making a grant to the dependents of these men, but the matter is being considered.—H. HOLLIDAY, engineer and manager.

Rochdale Corporation Tramways.

Twenty of the Rochdale Corporation Tramway employees have joined the colours, *i.e.*, 11 drivers, five conductors, and four other employees. The Corporation have decided to pay to the wives in the cases of married men, and dependents in the cases of single men, half wages during their absence. The cost to the department will be between £15 to £16 per week.—GEO. WEBSTER, general manager.

South Shields Corporation Tramways.

Eleven of our employees have joined the forces, one from the office, two from the repair shops, and the remainder from the traffic staff. The committee have decided to pay the dependents of these men 5s. per week for wife and 2s. per week for each child. The tramway men are subscribing each week to the National Relief Fund.—W. T. ROBSON, general manager and engineer.

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Rotherham Corporation Tramways.

Fifteen employees have joined the colours. The conditions granted to these employees are of a temporary nature, although adequate for present needs.—EDWARD CROSS, engineer and manager.

Sheffield Corporation Tramways.

One hundred and forty-five of the Sheffield tramway employees have been called to the colours, as follows: Motormen—43 rejoined the colours, three rejoined the Navy, and 21 mobilised with the Territorials. Conductors—28 rejoined the colours, six rejoined the Navy, and 21 mobilised with Territorials. Other employees - 11 rejoined the colours, four rejoined the Navy, and eight mobilised with Territorials. The Corporation have not yet decided what is to be the amount to be paid to dependents of these men, but a committee is dealing with the matter.—A. R. FEARNLEY, general manager.

Southampton Corporation Tramways.

The following members of our staff have been called to the colours: 13 motormen, 19 conductors, and seven other employees, making a total of 39. All these men have been granted half wages during their absence, and their places will be kept open until their return.—LEONARD JOHNSTON, general manager.

Southend Light Railway and Electricity Department.

The number of our men called up to join the colours includes seven drivers, eight conductors, and six other employees. The Corporation are paying half-pay to those who are married or have dependents on them.—ROBERT BIRKETT, electrical engineer and general manager.

South Lancashire Tramways.

The following employees have been called up for service: Eight drivers, five conductors, and eight other employees, making a total of 21. The company has decided, in the case of married men called up, to pay the wife 10s. per week and 1s. per week for each child. This refers to cases where the income will be under the standard wages of the husband who has been called up. Also, an allowance has been made of 10s. per week in the case of single men who have been called up for service, and who were the only support of their parents. The employees have also decided to contribute the sum of 3d. each per week to the general aid fund, to be applied in cases of distress brought about through stoppage of work in the various departments consequent on the war.—E. H. EDWARDES, general manager.

South Metropolitan Electric Tramways and Lighting Company.

We have about 25 employees who have joined the colours as reservists and territorials. We have also joined the T.O.T. Mutual Aid as regards their dependents.—A. V. MASON, general manager and engineer.

Southport Tramways Company.

Although none of our employees have joined the colours, they are subscribing 3d. each per week towards a mutual aid fund which has been formed at our head office to assist the dependents of those employees from other associated companies who have joined the colours.—JOHN LLOYD, manager.

Stalybridge, Hyde, Mossley, and Dukinfield Tramways and Electricity Board.

Up to the present time 18 of our men have joined the colours, including one inspector, four drivers, nine conductors, and four other employees. A number of National Reserves are also daily expecting to be called up. The Board have decided to pay half wages to every man called up, but in no case shall the minimum amount paid be less than 10s. The employees have decided to subscribe to a war relief fund.—FRANK SCHOFIELD, commercial manager.

Stockport Corporation Tramways.

Twenty employees have joined the colours, including three drivers, 11 conductors, and six other employees. Other men are enlisting in the new army. The Corporation have decided to pay the dependents of these men as follows: 10s. per week each to wives, and 2s. 6d. per week in respect of each child. The tramway men in regular employment are voluntarily contributing 3d. per week in respect of every 10s. earned; some employees paying more. The contributions are being paid over to the Prince of Wales' National Relief Fund.—A. T. EARDLEY, tramways manager.

Sunderland Corporation Tramways.

Up to the present 16 of our employees have been called to the colours, including one motorman and 11 conductors. Eighteen more men are expected to go shortly. According to a resolution passed by the Council, these men are being allowed leave of absence during their naval or military service, and will be reinstated on their return with no loss of position or emoluments consequent on their enforced absence. They are also being paid such sums as, with the pay they receive from the Government, will make up their full wages.—A. R. DAYSON, general manager and engineer.

Tyneside Tramways and Tramroads Company.

Seven of our men have joined the colours. Their positions with the company are being kept open for them until their return. The directors have not yet given their decision as to allowances to the dependents of those employees who have been called up.—J. C. LITTLE, secretary and resident manager.

Sunderland District Electric Tramways

Between 20 and 30 employees have been called to the colours or have volunteered up to the present. The remaining employees have started a fund for the assistance of the wives of these men. This fund is officially recognised by the company, who are financially assisting it each week. The men have decided to have the following deductions made from their money: When earning 30s. and over, 1s. per week; 25s. to 30s., 9d. per week; 20s. to 25s., 6d. per week; under 20s., 3d. per week. It has been decided to make an allowance of 7s. per week for the wife or other dependent of the man who has gone away, and, in addition to this, 1s. 9d. per child.—G. STRATTON, manager.

Wallasey Corporation Tramways.

The number of men of all ranks belonging to this department who have joined the colours is 31, namely, 12 drivers, 15 conductors, two clerks, one mechanic, and one labourer. Altogether there will be about 100 men in the employ of the Corporation who have been called up for service. The terms granted by the Corporation are as follows: Married, full wages less separation allowance paid by the War Office to wives and families; single men with dependents, full pay; without dependents, full wages less army pay.—R. R. GREENE, general manager.

Walsall Corporation Tramways.

Seventeen employees, comprising four motormen, seven conductors, five shedmen, and one clerk, have been called upon for service with the Army. The Tramways Committee decided that the positions of these men should be kept open, and that an allowance equal to half wages be made in the case of those having dependents. A subscription list has been opened on behalf of the Prince of Wales' National Relief Fund, as the majority of the men are anxious to make some weekly contribution during the continuance of the war.—R. L. HORSFIELD, general manager.

Walthamstow Council Tramways.

About 10 per cent. of the staff of this department are serving with His Majesty's Forces, and comprise the following: Six motormen, 11 conductors, and two employees of other grades. The Council have decided that all employees shall be granted leave of absence who are called for embodiment, or who enlist, in the Army or Navy. Further, they have agreed to payment being made to the wives of married men so called out, to make up their income, including Army or Navy allowances, to an amount within 10s. per week of their ordinary wage. That is to say, in the case of a man who was earning 35s. per week, his wife will receive about 17s. 5d. from the Council, thus making her income, with Government allowance, about 25s. per week.—WM. MURRAY, tramways manager.

Warrington Corporation Tramways.

Five employees belonging to the Warrington Corporation tramways department have joined the colours, including one driver, one conductor, and three other employees. The military pay is made up by the department to the amount received by them in tramway service, viz, a man earning 30s. per week with the Corporation, and on joining the forces 10s. per week, his dependents would receive £1 per week from the Corporation, and in addition to this his situation will be kept open for him.—J. TELFER, tramways manager.

West Ham Corporation Tramways.

Eighty employees of the West Ham Corporation Tramways have joined the colours, including 36 drivers, 34 conductors, and 10 other employees. Single men without dependents while away will receive half-pay. Married men or single men with dependents, the difference between the pay received from the military or naval authorities and their ordinary weekly wages, but in no case shall any man receive from the combined sources a greater sum than the full amount of his ordinary weekly wages.—J. S. D. MOFFET, tramways manager.

Wigan Corporation Tramways.

Twelve employees have been called to the colours. The question of allowance to dependents of these employees has been considered by the Corporation, and it has been decided that the wages of the men who have left for service should be paid week by week into a special fund. In view of varying circumstances it was also decided to consider each case upon its merits, and a suitable weekly allowance is now being granted where necessary. The tramway employees have decided to agree to a deduction of 2d. per week from their wages, and this amount is to be paid into the National Relief Fund.—FRANK BUCKLEY, general manager.

Wolverhampton Corporation Tramways.

Twenty-two employees of the Wolverhampton Corporation Tramways have joined the colours, two drivers, 13 conductors and spare drivers, two inspectors, and five other employees. During the time these men are away on active service we are paying their wives an equivalent sum to that which they obtain from the Government. Thus, if a wife is paid 1s. 1d. by the Government, and she has two children, the allowance for whom is 2d. per day, the total amount she would receive from Government would be 9s. 11d. per week. We allow her a similar amount, so that the total amount she would receive would be 19s. 10d. If, on the other hand, an employee is single, but has a mother or others dependent upon him, we are dealing with each case separately, and with some allowing half-pay.—W. A. LUNTLY, general manager.

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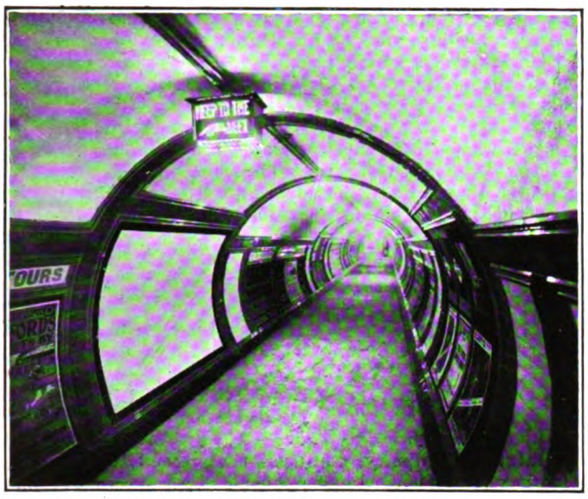
LIGHTING ON THE UNDERGROUND.

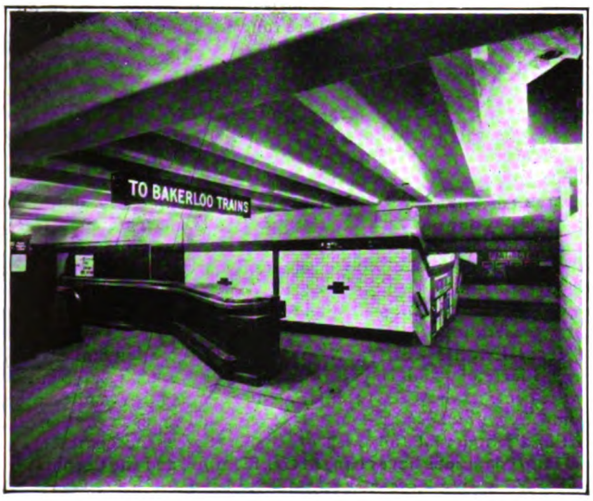
The accompanying illustrations are of interest as evidence of the brilliancy of the electric lighting of the extensions of the underground railways under the District Railway Station at Charing Cross. Through the courtesy of the General Electric Company, Limited, who are in turn indebted to the Underground Railways for permission



Corridor Connecting the Bakerloo and Hampstead Lines at The Embankment.

to take photographs, we are able to reproduce illustrations of the corridor connecting the Bakerloo and Hampstead lines and the top of the escalator at Charing Cross by which passengers descend from the District line to the Bakerloo or Hampstead lines, and *vice versa*.

It is interesting to note that these illustrations were taken solely by the lighting system in vogue. In the case of the corridor, the illumination is effected by means of Osram drawn-wire lamps, enclosed in the



The Top of the Escalator at Charing Cross.

well-known G.E.C. "Superlux" globes, and, in the case of the booking hall at the top of the escalator, the illumination is again effected by Osram lamps in "Superlux" bowls. The evenness of light distribution is remarkable, and the General Electric Company, Limited, are to be congratulated on the lighting results obtained from the use of Osram lamps in conjunction with "Superlux" glassware.

LIGHT RAILWAY ORDERS.

The Board of Trade have confirmed the following orders made by the Light Railway Commissioners:

Swansea Corporation Light Railways (Extension) Order, 1914, authorising the construction by the Corporation of Swansea of further light railways in that borough.

North Devon and Cornwall Junction Light Railway Order, 1914, authorising the construction of a light railway in the county of Devon from Torrington to Halwill, including the reconstruction of part of the mineral line known as the Torrington and Marland Railway.

FINANCIAL REPORTS AND MEETINGS.

Llanelly and District Electric Lighting and Traction Company, Limited.—An interim dividend on the preference shares for the half-year to June 30 at the rate of 6 per cent. per annum has been paid.

Hadfields, Limited.—Interim dividend of 1s. per share, tax free, on the ordinary shares was paid on August 22 out of the profits of the half-year ended June 30. A year ago the dividend was at the same rate.

Oldham, Ashton, and Hyde Electric Tramway.—In view of the circumstances arising out of the present war, the directors have postponed the interim dividend on the ordinary shares. The half-yearly dividend on the preference shares was paid as usual.

Stewarts and Lloyds.—The directors have declared interim dividends for the half-year ended June 30 at the rate of 6 per cent. per annum on the preference shares and 10 per cent. per annum on the preferred ordinary shares, and a dividend of 6d. per share on the deferred shares. A year ago no dividend was paid on the deferred shares.

Guest, Keen, and Nettlefolds, Limited.—The directors announce the payment of final dividends as follows: On the preference shares at the rate of 5 per cent. per annum for the half-year ended June 30, and on the ordinary shares at the rate of 10 per cent. per annum for the half-year ended June 30, together with a bonus of 1s. per share on the ordinary shares, all free of income tax.

Southampton Corporation Tramways.—The accounts for the year ended March 31 last show that the total revenue was £70,598 (equal to 10·974d. per car-mile), and the working expenses £46,521 (7·231d. per car-mile), leaving a balance to net revenue account of £24,078. An amount of £7,118 is transferred to depreciation and renewals fund, and after paying interest, sinking fund, etc., there remains £2,360, which is transferred in aid of the rates.

Brazilian Traction, Light, and Power Company.—The directors have declared a dividend of 1½ per cent. on the issued ordinary capital stock. A circular issued to the shareholders states that there is not the least foundation for the various rumours, or any ground for uneasiness, with reference to the company's affairs. Statements have been circulated both by the Brazilian Company and by Guinle and Company concerning the competition that the latter will offer next year through their Companhia Brazileira de Energia Electrica, in Rio de Janeiro.

Cardiff Corporation Tramways.—The annual reports for the year ended March 31 last of Mr. J. Alcock, city treasurer, and Mr. A. Ellis, tramway engineer and manager, have been submitted to Cardiff Tramways Committee. They show that the net surplus was £18,594, a decrease of £1,732 compared with the previous year. A sum of £6,946 has been transferred to the depreciation fund, and of the balance £4,800 goes to the relief of rates, leaving unappropriated £6,848. The committee agreed to vote a further £4,800 to the relief of rates. The traffic receipts amounted to £142,041, being an increase of £12,776.

Lanarkshire Tramways Company.—At the twenty-sixth ordinary general meeting held in London on August 7, Mr. A. R. Monks, who presided and moved the adoption of the report, stated that the result of the half-year's working showed that the revenue was £50,595, and the expenses £32,650, and after providing for contributions payable to local authorities, interest on debentures, and, including the balance brought forward, there was an amount available of £15,935. Out of this the directors recommended a dividend at the rate of 6 per cent. per annum for the half-year on the issued share capital, and to carry forward to new revenue account £5,645. The revenue for the half-year showed an increase of £7,145, and the expenses an increase of £7,995, as compared with the corresponding half of 1913.

Kirkcaldy Corporation Tramways.—For the year ended May 15 this undertaking had a gross profit of £6,495, as against £6,158 the previous year, and after the payment of interest, sinking fund, and depreciation, the net profit was £841. Receipts amounted to £17,947, and the working expenses £11,454. From the electricity undertaking there was a gross profit of £4,251, and a net deficit of £186. Current for the tramways was charged at 1d. per unit. The tramway receipts averaged 8·936d. per car-mile. Passengers numbered 5,781,895, made up of 54·13 per cent. of halfpenny fares, 10·07 per cent. of workpeople at halfpenny fares, 26·90 per cent. of 1d. fares, ·80 per cent. of workpeople at 1d., 8·04 per cent. of 1½d. fares, and ·06 per cent. at 2d. Of the capital account of £96,748, the sum of £18,880 has been repaid.

Tyneside Tramways and Tramroads Company.—The report of the directors for the half-year ended June 30, 1914, states that the surplus of receipts over expenses is £5,824, which, with the balance brought forward from last half-year, makes a total of £6,212, and after deducting interest on debentures, loans, etc., there remains an available balance of £5,200. This profit the directors propose to appropriate as follows: To the payment of dividend on the preference shares at the rate of 5 per cent. per annum (less income tax), £601; to the payment of dividend on the ordinary shares at the rate of 3 per cent. per annum (less income tax), £2,008 10s.; and to the credit of reserve for renewals, depreciation, and other contingencies, £1,200. This will

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increase the fund to £17,526. There is carried forward to next half-year £1,060. The traffic receipts show an increase of £986, as compared with the corresponding period of last year.

East Ham Tramways.—The accounts for the year ended March 31 last show that the total revenue was £54,915, as compared with £57,660 in the previous year, while the working expenses were £48,129 against £45,404. The percentage of working costs to revenue was thus 87·6 compared to 78·8. The gross surplus was £6,786, against £12,256. After providing for interest and sinking fund there is a deficit of £5,665 compared with a deficit of £275 in the previous year. The total working expenses were equal to 7·65d. per car-mile, compared with 7·92d. in the previous year. The number of car-miles was 1,510,251, compared with 1,375,433, while the number of passengers was 16,671,505, against 17,775,698. The total revenue per car-mile was 8·73d., against 10·06d. The energy consumption per car-mile was 1·58 units, against 1·55 units. No less than 64·22 per cent. of the passengers were carried at ½d. fares, and these yielded 40·92 per cent. of the receipts.

Blackpool Corporation Tramways.—The report by Mr. C. Furness, general manager of Blackpool Corporation Tramways, for the year ended March 31 last, shows that the total receipts were £84,797, being an increase over the previous year of £10,631. The working expenses were £43,486, an increase of £3,805. The gross surplus of £41,311 has been allocated as follows: Interest and sinking fund charges, £16,758; permanent way renewal fund, £10,000; reserve fund, £2,552; leaving a surplus for rates of £12,000. The gross surplus of £41,310 is equivalent to approximately 13·3 per cent. on the capital outlay, and after providing for interest and sinking fund charges, the available surplus represents 7·8 per cent. on the capital outlay. The increase in the receipts is the more remarkable seeing that there was no Easter in the financial year, while the preceding financial year embraced two Easters. The receipts per car-mile were no less than 18·91d., compared with 16·93d. in the previous year. The number of cars is 84, of which 24 are of the toast-rack type.

Sheffield Corporation Tramways.—The report for the year ended March 25 last shows that the total income from the tramways was £389,676. The working expenses were £232,761, equal to 6·288d. per car-mile, an increase of ·112d. compared with the previous year, chiefly accounted for by an increase in the cost of coal, permanent way repairs, and rates. Net revenue was £156,915, and after deducting interest, sinking fund, income tax, etc., and adding interest on investments, there is a net credit balance of £77,607. Out of this sum £30,123 goes to renewals fund, £7,669 to street improvements, £2,000 to special purpose fund, and £7,234 to accumulated surplus fund, the remaining amount of £30,582 is transferred to the general district rate. The expenditure on renewals of permanent way was £25,255. The number of car-miles run was 8,883,576, and the number of passengers was 104,851,408, compared with 96,330,242 in the previous year. Particulars of the results of the motor omnibus service are given in the report, and are summarised in our Motor Traffic Section.

Aberdeen Corporation Tramways.—The report of the general manager, Mr. R. Stuart Pilcher, for the year ended March 31 last, states that the total revenue was £85,267, being an increase of £5,100 compared with the previous year. The total is the highest figure yet obtained, and the increase is the greatest ever obtained in one year. The working expenses amounted to £47,036, being an increase of £3,830. The increase is due to 93,621 additional miles having been run, the increase in wages granted to employees, and the increased cost of material. After allowing for interest, sinking fund, depreciation and renewals, there remains a net profit of £14,062, being an increase of £1,537. This profit is the largest ever obtained, and the whole of it is available for the reserve fund. This reserve fund now amounts to £29,507, and the depreciation and renewal fund to £140,480. The number of miles run was 1,832,587, and the passengers carried were 22,218,142. The number of units per car-mile was 1·184, as compared with 1·213, and the cost of energy was ·956 per unit. The revenue per car-mile was 11·17d., and the working expenses 6·16d.

Manaos Tramways and Light Company.—At the annual meeting held in London, on August 26, Mr. G. M. Booth, who presided, said that the world of finance and commerce was completely disorganised, and the future of all companies somewhat obscure. With them the obscurity was deepened by the problem of Brazilian exchange. In regard to the State debt for public lighting, their efforts to collect this had not met with any success. The amount of the debt due to them on April 30, 1914, was £33,898, and, he feared, present conditions would further postpone a settlement. The accounts for the year under review showed tramway receipts amounting to £87,029, against £106,148 for the previous year, a decrease of £19,119. The lighting receipts amounted to £44,395, against £44,148 for the previous year, an increase of £247, their total gross income decreasing from £151,741 to £132,877. The total operating expenses decreased from £101,942 to £96,848, and their net surplus had decreased from £28,107 to £14,426, or over 48 per cent. The directors recommended the transference of £8,000 to the contingencies and accident reserve account, and to the renewals reserve £6,000. The balance of £3,861 they proposed to carry forward. The report was adopted.

Montreal Tramways Company.—The report of the Montreal Tramways Company for the fiscal year ended June 30 last shows that the gross earnings were $7,142,804, and the working expenses $4,206,115, leaving net earnings of $2,936,689. After deducting city percentage of earnings, interest, and taxes, there remains a net income of $736,837. After paying dividends and transferring $275,000 to contingent renewal account, a sum of $137,544 is transferred to general surplus. The gross earnings show an incease of 5·75 per cent., the working expenses an increase of 4·3 per cent., and the net earnings an increase of 7·9 per cent. The ratio of expenses to earnings is 58·89 per cent., compared with 59·71 per cent. During the year there has been expended on capital account for additional rolling stock, extensions, and improvements $2,711,572. Large additions have been made to the rolling stock during the past year. A new type of motor car and trailer has been introduced which has very materially helped the service on the main line, and the company is now considering the advisability of building more cars of this type. The increased rolling stock and extensions have necessitated further additions to the power requirements. The company has also completed a large portion of the rebuilding of the track.

NEW CONTRACTS AND ORDERS.

St. Helens Cable and Rubber Company have received an order from Warrington Electricity and Tramways Committee for cables, at £1,657.

The British Insulated and Helsby Cables, Limited, have received an order from Edinburgh, in substitution of an order recently placed with a German firm.

The Daimler Company, Limited, have recently obtained contracts for the supply of motor omnibuses to the corporations of Coventry, Reading, Nottingham, and Leicester.

The Railway Department, Sydney, Australia, have accepted the following tenders: Specification 434, one 1,000-KW. sub-station unit Australian G. E. Company; two 1,000-KW. sub-station units, British Westinghouse Company.

Sunderland Town Council has accepted the following tenders: Cables, British Insulated and Helsby Cables Company, and India-Rubber, Gutta-Percha, and Telegraph Works Company; E.H.T. switch and meter cabinet, British Thomson-Houston Company.

Messrs. Siemens Brothers Dynamo Works, Limited, have been awarded a contract by the London County Council for 125,000 Tantalum traction lamps. The same firm have a contract for a 12 months' supply of Wotan drawn-wire tungsten lamps for H.M. Office of Works.

Bradford Cancels German Contract.—The Electricity Committee of Bradford Corporation on September 1 cancelled the contract for a 5,000-KW. turbo-generator which was being manufactured by the Bergmann Elektricitats-Werke A.G., Berlin, and decided to transfer the order to the British Westinghouse Electric and Manufacturing Company. The amount of the original tender was £9,370.

Aberdeen Tramways Committee proposed to order six additional cars of the pay-as-you-enter type at a cost of £4,284. The contracts proposed were: Bodies, Brush Electrical Engineering Company, £2,742; motors, Brush Company, £1,080; electrical equipment, British Westinghouse Company, £462. At a meeting of the Corporation on August 17, the proposal was referred back to the committee for further consideration.

A Diesel Engine Contract.—Wallasey Corporation and Messrs. Mirrlees, Bickerton, and Day, by a friendly arrangement, have put an end to the contract of April, 1912, for a Diesel engine-driven alternator. The company will take back the Diesel engine and the Corporation will retain the alternator at the price of £948. Since the contract was entered into, conditions have changed considerably, and the Corporation has embarked upon a large new steam-driven station.

Johannesburg Town Council has accepted a tender for five miles of 4-0 trolley wire at £473 from the United States Product Company. Other tenders were as follows: W. T. Henley's Telegraph Works Company, £491; British Insulated and Helsby Cables, £481; A.E.G. Company, £488; Rice and Wilson, £505; Siemens Brothers and Company, £506; W. Hosken and Company, £520. The Corporation have also accepted the tender of W. T. Henley's Telegraph Works Company, Limited, at £262 10s. for 1,000 sets of single-pole cut-outs complete with sealing chamber.

The British Vacuum Cleaner Company, Limited, have recently been favoured with an order by the London and North Western Railway for two of their largest type fixed cleaners, one for Euston cleaning sheds and one for Willesden. Each cleaner consists of four dust filters of the "K" type coupled up by means of steam barrel and connected to a horizontal "Booth" cylinder vacuum pump, which is driven by belt from a 30-H.P. electric motor. Each plant is capable of working 20 cleaners at one time, and we are given to understand by the company that a very large amount of cleaning work rapidly done is possible with these large fixed cleaners. The company has now supplied a considerable number of these machines, notably to the North British Railway, the Great Western Railway, the Midland Railway, and North Western.

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PERSONAL.

Mr. J. Pedriali, the general manager of the Anglo-Argentine Tramways Company, is at present on a visit to this country.

Mr. H. P. Maybury, who became chief engineer to the Road Board in November last, has been appointed to a new post with the title of manager and engineer.

Mr. B. Thompson, who has been associated with Messrs. W. A. Stevens, Limited, for some time, and previously with the Lacre Motor Car Company, has now joined the British Berna Motor Lorries, Limited, as sales manager.

Mr. C. A. L. Prussman, who has held the position of borough electrical engineer to the Swansea Corporation for the past 10 years, has resigned. The Council have advertised the post, and are offering a salary of £500 per annum.

Mr. C. Koettgen has tendered his resignation as a director and managing director of Siemens Brothers Dynamo Works Company. His resignation has been accepted, and Mr. Koettgen has no further connection with the company.

Mr. G. H. Hume, the chairman of the London County Council Highways Committee, has been appointed a member of the Special Committee of the Council to deal with emergency matters till the Council's ordinary meetings are resumed in October.

Mr. Charles Furness, electrical engineer and tramways manager to the Blackpool Corporation, returned safely from his trip to Eysden in Holland, near the Belgian border, where he had gone for the purpose of bringing home his daughter who was at school there.

Mr. Joseph Thompson, of Sheffield, who is executing some large contracts for the London County Council, Bradford, Rotherham, and Sheffield Corporations, has removed to larger and more convenient premises at Columbia Works, 106, Eyre Street, Sheffield.

Mr. Charles Stafford Schultz, a director of Messrs. Dick, Kerr and Company, Limited, who is a British subject born at Ingersol, Ontario, announces that on August 14, 1914, he renounced the surname of Schultz, and adopted the name of Charles Stafford Stafford.

Mr. E. E. Sharp has joined the board of the Jackson Electric Stove Company, Limited, 3, Blandford Street, W., and will act with Mr. Williams in the direction of the business. It will not affect his connection with Messrs. Chamberlain and Hookham's meters and Venner's time switch business.

Mr. D. N. Dunlop, secretary of the B.E.A.M.A., who was in Zurich when the war broke out, returned to London early in August. He left Zurich on Wednesday August 5, and only arrived in Paris at noon on the following Saturday. The journey from Zurich to Paris occupied three days under extremely uncomfortable conditions.

Mr. W. Vincent Edwards has been appointed engineer and general manager of the Hastings and District Electric Tramways Company, Limited, as from September 1. He has, for some months past, been in charge of the system as deputy manager, during the illness of the late Mr. Thos. B. Holliday. Mr. Edwards was one of the first to join the electric traction branch of Messrs. Dick, Kerr and Company, and saw a good deal of service with them in various English and Continental towns. Subsequently he was in their London office for several years, before moving down to the Hastings Company, of which he is now manager.

Mr. R. H. Sperling, on resigning the position of general manager of the British Columbia Electric Railway Company, Limited, was presented by the office staff and employees with a gold cigar box and a large framed group photograph of the employees. Mrs. Sperling received a five stone diamond ring enclosed in a gold casket. The presentations were made at the Vancouver office of the company in the presence of about 400 members of the staff and their families. A farewell banquet was given to Mr. Sperling at the Hotel Vancouver, when Mr. Sperling said that while he was leaving British Columbia with deep regret, he felt that in London he might be able, understanding the conditions now prevailing throughout the company's field, so to advise that the best interests of the company would be served by the action of the London board.

OBITUARY.

The death took place at the end of August of Mr. Edgar Armitage at the age of 48 years. The deceased had been employed by the Yorkshire Electric Tramways Company since that company commenced operations. He went with the Dewsbury Detachment of the 4th King's Own Yorkshire Light Infantry to Doncaster, in response to the mobilisation orders, but on parade on the day following his arrival at Doncaster, Mr. Armitage did not feel well. He was taken to hospital, and died later in the day.

The death is recorded, at the age of 51 years, of Mr. Charles Cordingley, proprietor and editor of publications connected with the motor trades, and organiser of motor car and other exhibitions at the Agricultural Hall.

We regret to record the death, at the age of 66 years, of Mr. Frederick Smith, which occurred at Swinford Old Manor, Ashford, Kent. Mr. Smith was managing director of Messrs. Frederick Smith and Company, Limited, wire manufacturers, of Halifax and Manchester. He was also a director of the London Electric Wire Company.

Mr. Thomas B. Holliday, engineer and manager of Hastings and District Electric Tramways, died on September 3, after having been in ill health for a long time. Mr. Holliday's earlier professional life was spent in Melbourne, where he was a construction engineer for the cable tramway system, and subsequently was responsible for the organisation and operation of traffic. After 11 years he returned to England and joined the staff of the late Sir Clifton Robinson as chief engineer. In 1895 he was concerned in the construction of the first Bristol electric tramway, and he subsequently organised and operated the lines, being responsible also for the power-station arrangements. Other pioneer work which he undertook was the construction of the first electric line of the Dublin Tramway Company. In an extraordinary short period of time he carried out the survey and then the construction of the Middlesbrough and Stockton Tramways, for which he received a bonus of £500. Among other systems for which he made the surveys was the London United, and he superintended the construction of the power-station and some of the lines. After seven years with Sir Clifton Robinson he became engineer and general manager of Brighton Corporation Tramways, and five years later he was appointed engineer and general manager to the Hastings Company. This was about nine years ago, and Mr. Holliday has held the position ever since. He was highly esteemed by his colleagues both as a tramway engineer and an organiser.

BUSINESS NOTES.

J. Hopkinson and Company, Limited, have removed their London offices from Queen Victoria Street, E.C., to Imperial House, Kingsway, W.C.

The Light Railway Commissioners announce that the address of the offices of the Commission is now 49, Wellington Street, Strand, London, W.C. The telephone number is 5872 Regent.

The Edison and Swan United Electric Light Company, of Melbourne, have been appointed agents in Victoria and Tasmania for the alternating-current and direct-current meters, etc., of Messrs. Chamberlain and Hookham, Birmingham.

Messrs. S. Wolf and Company, of 115, Southwark Street, London, have placed upon the market a new electrical grinding machine for tramway rails, which embraces a number of features of interest to all concerned in the maintenance of tramway track.

"Mazda House News."—The July-August issue of "Mazda House News" contains much interesting matter, and is attractively got up. The articles, which are copiously illustrated, refer to Mazda lamps as made by the British Thomson-Houston Company in all styles, and the half-watt lamp receives special atteution.

A New Traction Lamp.—A new form of traction lamp with a drawn-wire tungsten filament has been put on the market by Siemens Brothers Dynamo Works, Limited, Tyssen Street, Dalston. These lamps are manufactured in England, and have spiralised filaments carried on spiders in the usual manner. Instead, however, of the filament being wound up and down, as has been the case previously, the spider is arranged so that equal lengths of filament are carried vertically and horizontally. Increased candle power and a longer life are claimed for the new lamp.

The Edison and Swan United Electric Light Company, Limited, Ponders End, Middlesex, send us the names and addresses of their colonial branches, which are as follows: The Edison and Swan United Electric Light Company, Limited, 368, Little Collins Street, Melbourne, Australia; The Edison and Swan United Electric Light Company, Limited, 58, Clarence Street, Sydney, N.S.W.; The Edison and Swan United Electric Light Company, Limited, 62/64, Queen Street, Brisbane, Australia. The agents for Royal Ediswan lamps in India are: Messrs. Balmer Lawrie and Company, Olive Street, Calcutta.

B.T.-H. Lamps.—It should be a matter of great satisfaction to all electric light users to know that, since the first introduction of the drawn-wire incandescent lamp in 1911, all the tungsten wire used in the manufacture of Mazda lamps has been produced in the Rugby factory of the British Thomson-Houston Company, Limited, who are, therefore, absolutely independent of any other country for their supply of incandescent lamp filaments. This fact places them in an excellent position to meet the utmost demands which can be made upon their resources, as the supply of Mazda lamps will not be in the slightest degree affected by current events. The announcement in August of last year of the discovery of the half-watt lamp has been followed by the wide-spread installation of these highly efficient lamps for outdoor illumination, most of the lamps used being, however, of German manufacture. The British Thomson-Houston Company's Rugby factory has been busily engaged in the manufacture of these important lamps during the whole of the past year, and British made Mazda half-watt lamps are now available in commercial quantities. All B.T.-H. lamps —whether metal or carbon filament—are of British manufacture.

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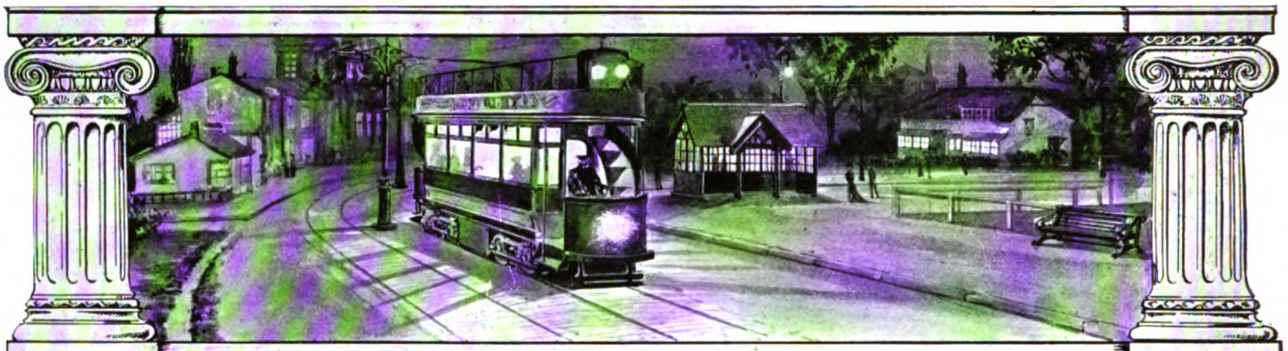

TRAMWAY AND LIGHT RAILWAY NOTES

ABERDEEN.

New Rolling Stock.

On Tuesday, August 18, Aberdeen Tramways Committee inspected six new cars which are now being put into service. They also agreed to recommend the Corporation to buy another six cars at a cost of £4,284. The recommendation on being submitted to the Town Council was, however, referred back to the committee for reconsideration.

BIRKENHEAD.

New Cars and Weather Screen Experiments.

During the last financial year six cars were purchased from Messrs. Siemens Brothers for use on the New Ferry route at a cost of £4,374. These cars were charged to capital account, as was also the equipment of six cars with new tops, the work being done in the car shops of the department. About a year ago, at the request of some of the drivers on the Birkenhead tramways, experiments were made with two types of weather screens for the protection of drivers, one a patented design and another made in the tramways department. Neither were found satisfactory, and they were removed from the cars.

BIRMINGHAM.

Motormen's Promptitude Rewarded.

Two of the Birmingham Corporation motormen have been complimented by the chairman of the Tramways Committee (Mr. Harrison Barrow) and awarded £1 each for individual smart actions. Driver Goode pulled his car up and avoided a woman who was unconsciously walking backwards into danger, and by similar action on another occasion he saved the life of a child who had run in front of the car. Driver Tustin by promptly stopping his car avoided running into a motor omnibus and a motor cycle, which had collided.

BRIGHTON.

Joint Plates to Reduce Noise.

In his report for the past year Mr. W. Marsh, the engineer and manager of Brighton Corporation Tramways, says: "Manganese steel plates to the number of 400 were fixed on the joints in Queen's Road and the lower end of Dyke Road, much to the satisfaction of those who live on the routes so dealt with. The reduction in the noise made by the cars was most marked; and it necessarily follows that the life of the rails must be prolonged in consequence." Thirty-one trucks have now been replaced with those of the Brill type. Only five axles were broken last year, as against 40 or 50 some years ago. This trouble now appears to be a thing of the past, the cure for it having been found.

BURTON.

Tramways and the Electrical Undertaking.

Alderman Lowe, chairman of the Electricity Committee of the Burton Corporation, made a statement at the last meeting of the Council with regard to the sale of electricity for power which clearly proved the wisdom of the practice of selling current at a price that would favourably compete with other sources of power—viz., gas, petrol, steam, etc. Referring to the period prior to the introduction of the tramways, Mr. Lowe said they continued to lose money year after year. The first substantial help to the undertaking was the tramways, but, owing to the low charge, more current was now sold for ordinary power purposes than for traction, and this at a price which was very low. Although more cheap current was sold last year than in any other year the department made a profit of £3,000, which was higher than for any previous period.

DUNDEE.

Abuse of the Free Carriage of Children.

In Dundee, as in various other towns in the country, children are carried free on tramcars, and this gives rise to some trouble to conductors, owing to the inconsiderate conduct on the part of some parents or guardians. The matter was brought before a meeting of the Tramways Committee by Mr. Peter Fisher, the manager. He cited a case in which a woman entered a car with two children, and as the latter were under five years of age they were not charged for. The children were placed on the seat by the mother, and although the car became full and passengers who had paid fares had to stand up, the mother refused when asked by the conductor to remove the children from the seat so as to allow the paying passengers to sit down. Several members of the committee stated that the conductor had the authority of the committee to enforce such a request. Mr. Fisher stated that he had seen several cases of the sort. It was agreed to give the conductors authority to see that passengers who had paid fares were not deprived of seats in such a manner, and some members of the committee expressed the opinion that the remedy against a refusal was to put the parent and children out of the car.

EDINBURGH.

Theft from a Tramway Company.

A peculiar case of theft from Edinburgh and District Tramway Company came before Edinburgh Police Court on August 14, when a man was fined £5, with the alternative of 20 days' imprisonment, for having stolen during a period between April 1 and August 11 101 tunics, 20 greatcoats, and 13 pairs of trousers from a store belonging to the tramway company. It was stated that he had been a car driver, and he had been employed from time to time in the company's clothing store. A shoemaker who kept a shop admitted having purchased the garments from an employee of the tramway company, who had said that he was the company's tailor. He had paid £3 7s. in all, giving 6d. for each garment. The cloth of the garments, which were worn and old, was used for making slippers.

GLASGOW.

The General Manager's "Safety Movement."

The determination of Mr. James Dalrymple, general manager of Glasgow Tramways, to do everything possible for the safety of the public in connection with the working of the tramways was shown in a fresh direction when it was reported at a recent meeting of the Glasgow United Free Church Presbytery that a letter had been received from Mr. Dalrymple suggesting that the Presbytery might set aside one Sunday in each year to be called "Safety Sunday," when ministers might give the question of safety special prominence in the service. The Presbytery resolved to send a reply stating that while they could not see their way to set aside one Sunday each year, they would do what they could in the matter.

LEEDS.

Personal Application for Workmen Fares.

Leeds Tramways Committee on August 17 made a somewhat unusual departure in connection with workmen's fares. They decided to extend the time during which such fares are charged from 7-45 a.m. to 8-45 a.m. in order that workmen should get the advantage of the reduced fare up till 8-45. Employers have to forward to the tramway department the names, addresses, and occupations of any employees who require to travel to work during the extended hour, and on a personal visit each workman will receive a card on the presentation of which the conductor will issue to him a workman's fare ticket. A similar arrangement is being made in Huddersfield.

LIVERPOOL.

New Type of Rolling Stock—Carriage of Goods on Tramways.

There are now about 30 of the new type of car designed by Mr. C. W. Mallins, general manager of Liverpool Corporation Tramways, in service, and 10 others are approaching completion. This type of car, which has been received with much favour, has separate entrance and exit staircases, transverse seats on both decks, a long wheel base, and a seating capacity for 73. These cars were described and illustrated in The Tramway and Railway World of November 14, 1912, and May 7, 1914. The Mersey Docks and Harbour Board have forwarded to the Liverpool Tramways and Lighting Committee

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their reply to the views advanced by a deputation from the committee which waited upon them in regard to the suggested use of the tramways for the transportation of merchandise. The Board state that in their opinion the scheme would for various reasons be impracticable, but that they would be inclined to favour a scheme for facilitating the conveyance of goods from the docks to inland centres by means of motor wagons.

LONDON.

Assistant Car Conductors in London—Commandeered Horses.

Mr. Bowerman, in the House of Commons, asked the Home Secretary a question as to whether he was aware that the order of April 21 last, authorising the licensing of assistant tramway conductors, had aroused much indignation among the men at present employed on metropolitan stage carriages; and, in view of the expressed opinion of the men concerned (which had already been brought to his notice) that the order in question was likely to prove detrimental to the travelling public and to the men at present employed on metropolitan stage carriages, as well as to the boys themselves, whether he was prepared to withdraw the order in question. Mr. M'Kenna has issued the following reply: Two deputations from different unions representing the workers have been received at the Home Office, of which one opposed and the other supported the order. The appointment of assistant conductors is in the interests of the travelling public, and the Commissioner of Police informs me that where introduced it has proved of much advantage and has been much appreciated by the men themselves. As at present advised, I am not prepared to withdraw the order.—On August 19 the old horse service of cars running from the West India Docks to South Hackney was discontinued. This particular line has presented an exceptionally difficult problem for the London County Council, as the proposed electrification on the overhead system has been steadily vetoed by the three local Borough Councils through whose areas the line runs. The Council has been losing £8,000 a year on the old horse lines, and now the war has come to the aid of the tramway authority in practically dealing with the problem, it being announced that the service is discontinued owing to the commandeering of so many of the horses for military purposes.

MANCHESTER.

Screw Jacks and Step-Guards.

An inquest was held recently on a child aged two years, who was found under the cradle of the life-guard of a tramcar. No one saw how the accident happened, and the motorman said he did not know the child was there until someone shouted to him. The jack was got out, the driver said, but it could not lift the car. Seeing that the jack could not lift the car, the public got round and lifted it bodily. The child was dead when taken out. The jury returned an open verdict, and expressed the opinion that the Corporation should take these jacks into consideration, especially after the number of cases reflecting on their efficiency which had occurred. Mr. Derbyshire (for the Corporation) said the jacks were quite strong enough to lift the cars. The suggestion was that on such occasions drivers got excited. The Corporation had now got permission to put guards under the steps of tramcars. Some cars already had these guards.

OLDHAM.

The Tramway Administration Vindicated.

The questions which had been raised in Oldham by Councillor Low in regard to the administration of the tramways department were brought to a satisfactory conclusion at a meeting of Oldham Town Council on August 5. A report by the Tramways Committee on the subject was presented, and showed that in the opinion of the committee the charges were trivial or disproved. After a discussion the report was adopted by a large majority. Alderman Isherwood, the chairman of the Tramways Committee, in winding up the discussion, stated that Dr. Low's charges were made on hearsay: they arose from the venomed spleen of a disappointed man, a discharged employee. It was the doctors who had been working this thing They had been to see him at Colwyn Bay to plead for the reinstatement of this man. Not a medical man in the town should coerce him. His reply to the charges was in the report of the committee, and he asserted that the tramways department was never in so satisfactory a condition as to-day.

READING.

Concessions to Employees.

The Tramways Committee have made a number of concessions to the employees of the department, including the following: Spread-over time and hours of rest now to be dealt with by the manager and engineer. Spare men are to receive 1s. for each day they register and do not obtain employment. The workmen employed in cleaning and working under the cars will be provided with overalls and clogs. First-aid appliances are to be provided at the depot, and a sufficient number of employees are to be instructed in rendering first aid.

ROTHERHAM.

Borrowing Powers for Extension.

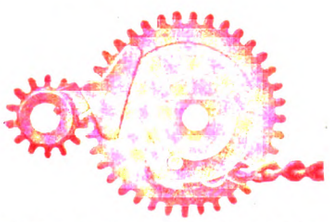
The Rotherham Council at their August meeting decided that a tramway from Westgate to Effingham Square, authorised under a Provisional Order of the present year, should be constructed in accordance with the powers obtained. It was also agreed to apply to the Board of Trade for sanction for a loan of £3,760 for the construction of the tramway.

5,258 "PEACOCK" BRAKES SOLD IN 90 DAYS!

Note the STOPS which form the special feature of The "Peacock"

IMPROVED BRAKE
(Patent),

and by preventing the drum from over-running on release save on the average three-quarters of a revolution of the handle at each application.



READY TO WIND. STOPS IN CONTACT.

WINDING.

Metropolitan Building,
New York City, August 26, 1913.

J. McI. Cater, Manager,
Peacock Brake Co.,
London, England.

Dear Mr. Cater:

It affords me pleasure and is only fair to inform you that the Peacock Improved Brake, shipped by you from England last Fall, was tested under the supervision of the Public Service Commission of this State, and was awarded the highest percentage for efficiency over all other hand-geared brakes - and, rest assured, they were all there. The outcome of this test resulted in the National Brake Co., of Buffalo, N. Y., immediately purchasing the rights from me to manufacture and sell the Peacock Improved Brake in the United States.

We have thus far only shown it to the companies mentioned below who have purchased the following number of brakes within the last ninety days.

The Brooklyn Rapid Transit Co.	4036
Second Avenue Railway Co.	550
New York Street Railways Co.	440
Third Avenue Railway Co.	102
Belt Line Railway Co.	80
Manhattan & Queens	50
Total Number Brakes Sold	5258

To my mind your success in Europe, and the initial sales in the United States, speak well for the future of the Peacock Improved Brake.

Yours sincerely,

The "PEACOCK" BRAKE CO., 27, Clements Lane, LONDON, E.C.

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SALFORD.

A Question of Indicators—Revenue from Special Cars.

At the last meeting of Salford Town Council Mr. Bratherton asked the chairman of the Tramways Committee whether the committee would consider the advisability of going back to the old system of indexing the cars instead of the numerical system that had lately been introduced. "S 17" for instance did not give a clear indication of the particular route along which the car was going to travel. They could not learn the route along which the car was going to travel without asking the motorman or the guard. Alderman Linsley said the people required educating before they would understand a new system such as that now in operation. When they were educated he thought they would fall into it. They were having a little handbook printed, which would explain all details with regard to the running of the cars, and this book would be circulated very largely. Mr. Bratherton said that it would only make confusion worse confounded if they had to read books on the matter. The old system was all that was necessary. —Mr. G. W. Holford, general manager of Salford Corporation Tramways, mentioned in his last annual report that there was a considerable increase in the number of special cars provided for Sunday school treats and other purposes. The number was 344 as compared with 278 in the previous year, the revenue thus earned being £452, an increase of £90.

SOUTHPORT.

Speed Limits and Stopping Places.

An illustration of the way in which things have advanced since the early days of electric tramways in this country was given by some of the proceedings at the last meeting of Southport Town Council. A minute was submitted asking for authority to make application to the Board of Trade to alter the speeds on certain routes, in one case the proposal being to increase the speed from 8 miles an hour to 15. One councillor objected to this proposal, as he thought it would be dangerous. Attention was called by another councillor to a recommendation that application should be made to the Board of Trade to abolish certain compulsory stopping places. The objection taken was that the stopping places were at a dangerous corner, and that it was necessary that all cars should stop there. Mr. Richardson, in reply to the discussion, said the electric cars were started in Southport in the very early days, and it was, in fact, one of the first systems in the country. The Board of Trade were very particular in those days with regard to the stops and the speed, and since then things were changed. Even in a busy city like Liverpool the speed limit was 18 miles an hour, while they in the comparatively quiet town of Southport were only asking for a limit of 15 miles. They had carefully considered the Board of Trade stops, and those for the abolition of which they intended to apply were at points where they considered there was no danger. The recommendations were adopted.

SOUTH SHIELDS.

Electric Accumulator Omnibuses.

The two electric accumulator omnibuses, which were put into service on July 30, have run very satisfactorily under all conditions. They are extremely popular in the district which they serve, and have been inspected by deputations from several towns who are investigating the merits of the electric omnibus.

STIRLING.

Purchase by the Corporation.

The directors of the Tramways Company have offered to sell their undertaking to the Town Council for £15,000, but as Mr. Peter Fisher, general manager of the Dundee Corporation Tramways, and Mr. Goudie, the borough surveyor, valued the tramway plant and assets of the company at £8,975 1s., the directors of the company were asked to reconsider their proposal. The County Council have consented to the Town Council promoting a Provisional Order for the acquisition and construction of the tramway subject to certain conditions, and providing that the County Council shall have power to purchase the undertaking in 1940 at a valuation, plus, say, three years' profits, in 1947 at valuation, and in 1954 under the terms of the Tramways Act.

WEST HAM.

The Traffic Board Question.

In his annual report on West Ham Corporation Tramways, Mr. J. S. D. Moffet, the manager, refers to the representations which have been made by a conference of the London tramway systems, urging the Government to give effect to the recommendations of the Select Committee with regard to setting up a new department which should combine the traffic duties of the Home Office, the Local Government Board, and the Board of Trade. It is to be regretted that no definite action has yet been taken. Should a new Traffic Department eventually be formed, or road maintenance grants be made by the Road Board owing to the destruction of the roads by heavy motor vehicles, tramway undertakings in the London district would no doubt receive considerable benefits. In West Ham, largely owing to traction engine and motor lorries and omnibuses, £22,034 was spent on track maintenance, compared with £14,061 and £8,799 respectively for the two preceding years.

PATENT LIST.

Specially abstracted for "The Tramway and Railway World" from the Official Journal of Patents.

*** If the inventions have been communicated the names of the communicators are given below in italics.

Applications.

The following Applications for Letters Patent have been filed:

17,774 Continuously moving platforms—S. V. Galley.
17,894 Electric motor control—British Thomson-Houston Company Limited, and H. C. Hastings.
17,928 Ticket delivering machines—Auto-Ticket Printing Company, and H. W. V. Wilson.
17,954 Compressed-air brakes—B. Janse.
18,062 Railway signalling apparatus—J. F. Wolff *(G. B. Fielding)*.
18,068 Life-guards—J. E. Drandorff.
18,143 Electrical conduit systems—M. J. Railing and T. Taylor.
18,144 Steam superheaters—H. A. Stenning and J. H. Stirling.
18,209 Vacuum automatic brake apparatus—Vacuum Brake Company, Limited, and G. G. M. Hardingham.
18,303 Railway signalling apparatus—W. Wright, L. Langford, and B. Weiss.
18,450 Control systems for railways—H. Wade *(J. Cowell, junior, and T. McCaughan)*.
18,458 Safety railway line for use on curves—S. R. Smith.
18,519 Electric tracks for vehicles—J. Vila.
18,592 Means for operating car brakes—J. McI. Cater.
18,642 Covers for the external seats of motor omnibuses—W. Sanderson.
18,651 Brakes—M. Fairclough.
18,652 Railway points—P. Lebeau.
18,663 Life-guard for motor omnibuses, tramcars, etc.—R. W. J. Truman and H. H. Hapgood.
18,674 Apparatus for grinding tramway rails—H. W. Laing and S. Butler.
18,681 Brakes—W. T. Howse.
18,732 Wheel for tramcars—W. Baxter.
18,745 Hand-operated car brakes—L. W. Horne and W. N. Crane.
18,755 Car axles—W. Randall.
18,756 Rail splices—W. A. Prahl.
18,758 Suspension of the trucks of tramway vehicles—E. Peckham, S. Thomas, and F. S. Andrews.
18,789 Rail fastenings—J. S. Miller.
18,802 Axle boxes for railway vehicles—A. S. Bailey.
18,863 Couplings for Westinghouse and similar brakes—R. E. Robertson.
18,954 Electrical railway signalling—J. Gardner.
18,972 Manufacture of railway or tramway rails—C. P. Sandberg.
19,005 Electrically-operated tramway points—L. T. Healey and B. D. Healey
19,021 Rail fastenings and gauges—C. K. McDermott.
19,106 Life-guards—A. A. Campbell and P. L. Tatham.
19,110 Electrical control of railway traffic—H. H. Dyer.
19,159 Axle boxes for railway and tramway vehicles—W. R. Preston.
19,182 Life-guard for motor omnibuses—B. S. Lister, junr.
19,238 Electro-magnetic track brake—D. Storjohann.

Specifications Published.

1913.

13,064 Electric railway signal relay to be operated by alternating currents—Johnson and Thorrowgood.
16,395 Ticket punching and registering devices—Gibson.
19,555 Bearings, axle boxes, etc.—Whitehead.
21,442 Speed indicators—Ford-Smith and Walker.
23,523 Guard for tramcars—Krienitz.
25,179 Process of welding rails—Th. Goldschmidt Akt-Ges.
13,820 Electrical connection devices for railway vehicles—Boirault.
16,588 Power transmission and propulsion for self-propelled vehicles and locomotives—Marshall.
24,062 Brakes for tramway and railway vehicles—Hatton.
9,103 Railway safe-running devices—Angus.
19,205 Electrically operating railway signals—Meakin.
25,129 Electrically-operated system and apparatus for automatic signalling on railways—Bottle.
27,163 Retrievers for trolley collectors—Wasson.
17,324 } Automatic railway switch mechanism—Shepherd and
17,325 } Shepherd Automatic Switch Company.
20,684 Time dials for railway signalling—National Electric Time Company and Swift.
22,535 Rails—Calder and Peat.
26,764 Fittings for electrical conduits—Hemming.

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28,512 Signalling apparatus for railways—Minchin.
17,618 Superheaters—Stirling and Schmidt's Superheating Company.
18,317 Brakes and life-guards—Roche.
19,691 Seats for trams, motor omnibuses, etc.—Barber.
21,480 Electrical connection devices for railway vehicles—Boirault.
23,877 Tramcar seats—Rayner.
25,448 Automatic stoppage of trains—Baldwin and Foulds.
27,928 Railway ties and rail chairs—Allison (*Steel Railway Tie and Appliance Company*).

1914.

3,150 High-tension electric insulators—Watkins.
11,516 Electric control apparatus for signalling systems—Cardwell.
1,407 Vehicle fenders - Ferguson.
196 Electrical coupling devices for railway vehicles—Boirault.
8,781 Metallic railroad ties—Green.
9,970 Retrievers for trolley collectors—Wasson.
12,331 Railroad ties—Seyler and Seyler.
13,883, 13,884, 13,916, 14,189 Railway safe-running devices—Angus.
769 Vehicle fenders—Wittmann.
8,698 Rail supports for railway sleepers—Green.
11,309 Supports for overhead conductors for electric railways—British Westinghouse Electric and Manufacturing Company, Limited (*Westinghouse Electric and Manufacturing Company*).
13,324 Ticket punching apparatus—Prescott.
2,595 Signalling systems—Lyng.
4,561 Railroad crossings—Cooper.
7,362 Railway vehicles and track adaptable to change of gauge—Newton.
7,586 Points and switches for tramways—Wilkinson.
9,978 Brakes—White.
12,683 Railway ties—Watson.

Berlin Tramways in the War —A Dutch official, who has returned from Berlin, gives an interesting glimpse of Germany under war conditions. Wages, he declares, have fallen 30 per cent. everywhere. In Berlin only women tram conductors are now seen, and old men are doing service as drivers. In other German towns similar conditions exist.

National Service and Electrical Engineers.—The Institution of Electrical Engineers has received offers of service from over 1,000 members and others in response to a circular recently sent out. A circular letter is now being sent to engineers of all the electric supply undertakings in the United Kingdom stating that a large number of electrical engineers have offered their services (subject to various periods of notice) to fill vacancies in connection with the public services, electric power-stations, tramways, railways, etc. These names have been classified by means of index cards under various headings, and are at the disposal of supply undertakings should any of the men's services be required.

TRAFFIC RETURNS.

Colonial and Foreign Tramways.

NAME OF COMPANY.	1913. WEEKS ENDED.				1914. WEEKS ENDED.				AGGREGATE.		
	Aug. 9.	Aug. 16.	Aug. 23.	Aug. 30.	Aug. 8.	Aug. 15.	Aug. 22.	Aug. 29.	Wks.	1914.	Increase or Decrease.
	£	£	£	£	£	£	£	£		£	£
Anglo-Argentine	55,298	54,126	53,957	50,368	54,377	52,585	44,691	49,000	35	1,869,506	– 15,006
Auckland ... ... (28 days)	18,960	...	...	...	20,782	...	...	...	4½	23,311	+ 1,244
Brazilian Street ... (month) Mlrs.	...	...	...	...	...	...	...	...	—	—	—
Brazilian Traction	...	...	...	...	...	...	...	...	—	—	—
Brisbane ... ...(month)	26,205	...	...	...	29,680	...	...	...	31	198,655	+ 21,447
British Columbia ... (month) $	755,943	..	...	...	690,023	...	...	...	5	690,023	– 65,920
Buenos Aires Port and City (month)	...	...	...	...	...	...	...	...	—	—	—
Buenos Ayres Lacroze ...(month)	45,221	...	...	...	43,327	...	...	...	5	43,327	– 1,894
Calcutta ... ... Rs.	65,534	66,096	63,772	63,712	69,317	68,138	67,300	65,247	34	23,53,388	+129,982
Cape Town ... ...(month)	...	...	...	...	...	...	...	...	—	—	—
Carthagena and Herrerias (month)	3,794	...	...	...	2,416	...	...	...	31	16,212	– 4,913
Cordoba ... ...(month)	13,629	...	...	...	14,256	...	...	...	17	56,233	+ 2,542
East India ... ...(month)	1,846	...	...	...	2,045	...	...	...	52	23,135	+ 1,008
Kalgoorlie ... ...(month)	...	...	...	...	...	...	...	...	—	—	—
La Plata ... ...(month)	4,770	...	...	...	4,358	...	...	...	31	33,602	– 2,740
Lima ... ...(month)	34,426	...	...	...	34,600	...	...	...	31	241,931	+ 9,365
Madras ... ... Rs.	(2 weeks)	27,034	(2 weeks)	28,084	(2 weeks)	28,340	(2 weeks)	29,529	34	4,65,638	+ 35,433
Manaos ... ... (month)	...	...	...	...	...	...	...	...	—	—	—
Melbourne ... ...(month)	...	...	...	...	...	...	...	...	—	—	—
Mexico ... ... (month) $	610,602	...	...	...	628,206	...	...	...	31	4,158,751	+282,609
Montevideo ... ...(month)	29,189	...	...	...	26,417	...	...	...	39	283,663	– 3,939
Para ... ... (month)	23,686	...	...	...	20,169	...	...	...	35	170,592	– 34,012
Port Elizabeth ... ...(month)	...	...	...	...	...	...	...	...	—	—	—
Puebla ... ... (month) $	...	...	...	...	...	...	...	...	—	—	—
Rangoon ... ...(month)	...	...	...	...	...	...	...	...	—	—	—
Shanghai ... ... $	...	...	...	...	...	...	...	...	—	—	—
Singapore ... ... $	...	...	...	...	...	...	...	...	—	—	—
Toronto ... ... (month) $	811,966	...	...	...	866,221	...	...	...	31	5,892,147	+424,695
Winnipeg ... ... (month) $	336,821	...	...	...	346,630	...	...	...	31	2,438,182	+128,987

(*Continued on page 218*).

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TRAFFIC RETURNS—*continued.*

Tramways and Omnibus Undertakings in the United Kingdom.

NAME OF COMPANY OR CORPORATION.	1913. WEEKS ENDED.				1914. WEEKS ENDED.				AGGREGATE.		
	Aug. 9.	Aug. 16.	Aug. 23.	Aug. 30.	Aug. 8.	Aug. 15.	Aug. 22.	Aug. 29.	Wks.	1914.	Increase or Decrease.
	£	£	£	£	£	£	£	£		£	£
Aberdeen Corporation	2,031	1,908	1,861	1,922	2,052	2,041	1,745	1,626	13	23,492	+ 1,131
Accrington Corporation	595	580	568	547	534	561	579	486	21	12,651	+ 335
Ayr Corporation	706	541	588	504	521	507	516	440	15	7,767	— 80
Bath Electric	1,289	1,615	1,178	1,448	1,503	1,026	1,011	1,080	34	33,878	+ 1,251
Birkenhead Corporation	1,370	1,290	1,274	1,370	1,333	1,322	1,276	1,229	21½	28,125	— 585
Birmingham Corporation	11,392	10,652	11,275	11,580	11,792	10,808	11,140	11,094	22	269,587	+ 19,327
Blackburn Corporation	1,384	1,332	1,319	1,279	1,316	1,694	1,624	1,295	22	30,965	+ 1,798
Blackpool Corporation	5,786	5,062	4,962	3,494	5,188	2,670	2,673	2,417	22	47,955	— 2,320
Bolton Corporation	2,781	2,716	2,725	2,778	2,741	3,112	2,908	2,689	22	62,616	+ 2,241
Bournemouth Corporation	3,174	3,280	3,031	2,846	2,551	2,241	2,183	2,248	22	50,324	— 766
Bradford Corporation	6,365	5,989	6,207	6,017	6,251	6,483	7,450	6,019	22	141,399	+ 9,178
Brighton Corporation	2,569	1,591	1,538	1,486	2,198	1,276	1,276	1,312	21½	27,035	+ 363
Bristol	11,819	8,682	9,269	8,921	12,088	8,893	8,776	8,638	34½	298,144	+ 20,094
British Electrical Federation	67,389	54,141	55,958	55,941	69,373	57,256	57,937	57,063	—	—	—
Burnley Corporation	2,107	1,741	1,684	1,661	1,570	1,608	1,524	1,308	22	36,684	— 1,160
Burton-on-Trent Corporation	381	335	302	312	366	323	307	298	22	6,784	+ 307
Bury Corporation	1,375	1,347	1,286	1,411	1,371	1,923	1,565	1,541	21½	31,573	+ 1,326
Cardiff Corporation	3,530	2,828	...	...	3,371	2,740	...	...	19	57,610	+ 2,491
Chatham and District	1,282	1,025	1,099	1,099	1,152	955	992	1,061	34	31,946	+ 420
Chesterfield Corporation	217	252	266	265	305	270	263	260	20	6,113	+ 471
Colne Corporation	335	278	303	302	251	296	276	229	—	—	—
Cork Electric	573	548	579	530	571	514	554	506	34	17,276	+ 140
Croydon Corporation	1,928	1,615	1,693	...	2,021	1,668	1,727	...	20	37,369	+ 2,377
Darlington Corporation	266	258	240	267	...	261	262	...	—	—	—
Derby Corporation	1,148	1,281	1,002	1,070	1,169	1,156	1,037	988	21½	23,057	+ 1,148
Dover Corporation	376	206	403	418	382	278	270	278	22	5,790	— 116
Dublin and Lucan	241	185	211	165	230	157	157	154	8½	1,471	— 163
Dublin United	7,540	6,482	6,655	5,362	6,859	6,207	6,309	6,078	34	203,048	— 4,200
Dundee City	1,301	1,265	1,239	1,381	1,264	1,244	1,333	1,283	14½	19,883	+ 252
East Ham Corporation	1,059	927	975	966	1,272	1,272	1,294	1,218	21½	24,297	+ 2,546
Exeter Corporation	489	399	405	412	476	371	356	368	22	8,162	+ 293
Gearless Motor 'Buses	632	576	602	605	376	404	550	575	35	16,406	+ 6,735
Glasgow Corporation	19,302	19,754	19,653	20,269	19,512	20,313	19,775	19,774	12	262,115	+ 10,099
Glossop (Urban Elec. Supply Co.)	139	140	128	134	125	145	168	125	35	4,431	— 80
Halifax Corporation	2,521	2,461	2,366	2,217	2,434	2,824	3,185	2,389	21	49,825	+ 3,237
Hastings and District	1,896	1,809	1,784	1,896	1,806	1,327	1,243	1,235	34	35,763	— 1,202
Huddersfield Corporation	2,408	2,198	2,145	2,141	2,316	2,600	2,349	2,185	22	72,419	+ 5,561
Hull Corporation	3,216	2,994	3,046	3,024	3,231	2,927	2,786	2,922	22	68,885	+ 1,914
Ilford U.D. Council	549	430	453	449	677	615	638	615	21	12,302	+ 2,267
Ilkeston Corporation	132	139	145	139	119	133	133	133	22	3,009	— 31
Ipswich Corporation	687	570	586	609	630	488	474	494	22	10,957	+ 351
Isle of Thanet	2,337	2,110	2,141	1,988	1,937	1,111	1,201	1,256	47	29,466	— 2,006
Kilmarnock Corporation	172	161	170	206	157	164	155	153	15	2,687	— 159
Lanarkshire	1,650	1,698	1,795	1,800	1,744	1,821	1,945	1,848	34	64,938	+ 7,976
Lancashire United	1,931	1,628	1,716	1,570	1,859	1,579	1,811	1,673	34	56,672	+ 5,082
Leeds City	9,161	7,899	8,386	8,285	8,665	7,717	8,276	7,860	22	186,874	+ 5,510
Leicester Corporation	3,042	2,670	2,789	2,876	2,991	2,674	2,653	2,689	35	100,795	+ 4,287
Leith Corporation	752	725	729	736	754	756	711	703	15	11,882	+ 518
Leyton U. D. Council	1,744	1,280	1,363	1,348	1,733	1,476	1,479	1,431	20	29,490	+ 1,721
Liverpool Corporation	14,348	13,463	13,271	13,103	14,493	13,645	13,496	13,048	34½	458,033	+ 13,220
Llandudno and Colwyn Bay	1,097	987	891	768	976	471	510	521	39	12,295	— 1,255
London County Council	43,285	38,847	40,360	40,289	46,199	43,314	43,353	42,575	21	935,224	+ 46,652
London General Omnibus	...	...	...	...	...	...	...	...	—	—	—
London United	9,382	6,876	7,331	7,046	8,047	6,320	6,628	6,369	35	218,432	— 1,379
Lowestoft Corporation	541	505	549	517	537	347	309	310	47	10,318	+ 312
Maidstone Corporation	286	212	229	223	297	220	222	228	22	4,898	+ 297
Manchester Corporation	17,969	16,985	17,200	17,214	17,101	17,139	17,021	16,042	22	388,157	+ 4,986
Metro. Electric Tramways	11,028	8,732	9,229	9,060	10,415	8,625	8,836	8,766	35	318,516	+ 5,483
National Steam Car	3,749	3,349	3,593	4,808	4,971	4,723	4,725	6,720	43	186,484	+ 71,190
Nelson Corporation	233	227	228	236	176	204	189	189	21½	4,648	— 109
Newcastle-on-Tyne Corporation	4,994	4,583	4,578	4,812	5,390	4,886	4,971	5,282	22	116,374	+ 10,995
Newport (Mon.) Corporation	941	783	790	829	1,027	798	799	808	22	18,759	+ 1,971
New St. Helens and District	1,391	904	892	838	1,381	894	964	1,108	8	8,105	+ 89
Northampton Corporation	746	577	616	595	714	530	504	522	21½	12,912	+ 105
Nottingham Corporation	3,663	3,208	3,244	3,296	3,815	3,154	3,225	3,236	21½	75,293	+ 3,423
Oldham Corporation	2,234	2,243	2,261	2,508	2,062	2,387	2,232	2,244	23	52,977	+ 1,926
Portsmouth Corporation	3,724	3,195	3,227	2,968	...	...	...	2,648	22	56,816	—
Preston Corporation	878	951	880	875	947	1,191	1,003	880	22	20,351	+ 694
Provincial	3,877	2,894	2,947	2,654	3,178	2,287	2,254	2,261	47	92,700	+ 2,123
Reading Corporation	905	718	742	742	907	739	705	700	21	15,862	+ 815
Rhondda Tramways	1,644	1,145	1,192	1,212	1,651	1,157	1,162	1,230	34	42,547	+ 1,986
Rochdale Corporation	1,787	1,729	1,666	1,691	1,524	2,027	2,216	1,828	22	37,191	+ 1,327
Rotherham Corporation	1,011	1,024	1,074	1,016	1,017	1,053	1,030	1,008	22	22,889	+ 902
Salford Corporation	4,959	5,142	5,039	5,268	4,775	5,184	4,670	4,696	22	114,043	— 2,018
Sheffield Corporation	7,470	7,088	7,444	7,412	7,407	7,342	7,412	7,231	22½	176,871	+ 7,433
Southampton Corporation	1,838	1,469	1,538	1,516	1,814	1,525	1,509	1,404	21	30,428	+ 1,300
Southend-on-Sea Corporation	1,983	1,697	1,170	1,673	2,135	1,446	1,461	1,467	22	25,868	+ 2,821
South Metro. Tramways	1,213	1,351	1,167	1,201	1,272	1,221	1,152	1,132	35	38,616	+ 8,105
South Shields Corporation	945	841	819	829	1,036	819	753	751	21½	17,817	+ 1,649
Sunderland Corporation	2,047	1,552	1,557	1,586	2,110	1,720	1,547	1,474	22	34,353	+ 1,534
Swindon Corporation	226	210	189	193	218	218	225	188	21	3,914	+ 324
Torquay Tramways	1,429	1,421	1,328	1,507	1,231	763	674	674	34	20,288	— 1,781
Tramways (M.E.T.) Omnibus Co.	8,915	7,893	8,364	8,613	8,846	8,996	9,084	8,896	35	313,649	+ 186,640
Tyneside Tramways and Tramroads	769	557	578	596	769	589	617	691	9	5,069	+ 232
Wallasey Corporation	1,794	1,482	1,412	1,374	1,716	1,477	1,445	1,350	21½	30,016	— 1,668
Walsall Corporation	764	597	681	686	744	605	629	599	35	21,882	+ 278
Walthamstow U.D. Council	1,030	765	827	794	990	861	925	859	22	18,810	+ 2,038
Warrington Corporation	461	438	410	428	466	426	419	423	21	9,476	— 124
West Ham Corporation	3,020	2,560	2,662	2,691	3,098	2,783	2,840	2,798	21	61,882	+ 2,987
Wigan Corporation	1,644	1,509	1,415	1,460	1,612	1,392	1,403	1,382	21	32,080	+ 299
Wolverhampton Corporation	1,011	1,129	1,084	1,100	1,002	974	970	975	23	24,492	— 50
Yorkshire (West Riding)	2,070	1,392	1,692	1,507	1,667	1,580	1,438	1,421	35	51,345	+ 662

ELECTRIC RAILWAY TRAFFIC RETURNS.

Owing to the European war, the Government have taken over the railways of Great Britain as from August 4, and the issue of traffic returns has been suspended. Consequently the traffic returns of the electric railways usually given on this page cannot be given.

TRAMWAY DIRECTORIES.

A useful feature of this issue is the directory of electric railways and electric tramways which will be found among the advertising pages. This directory contains the names of the chief officials and the principal particulars relating to each undertaking.

The directory is revised as occasion requires, and is the most up-to-date and comprehensive list published.

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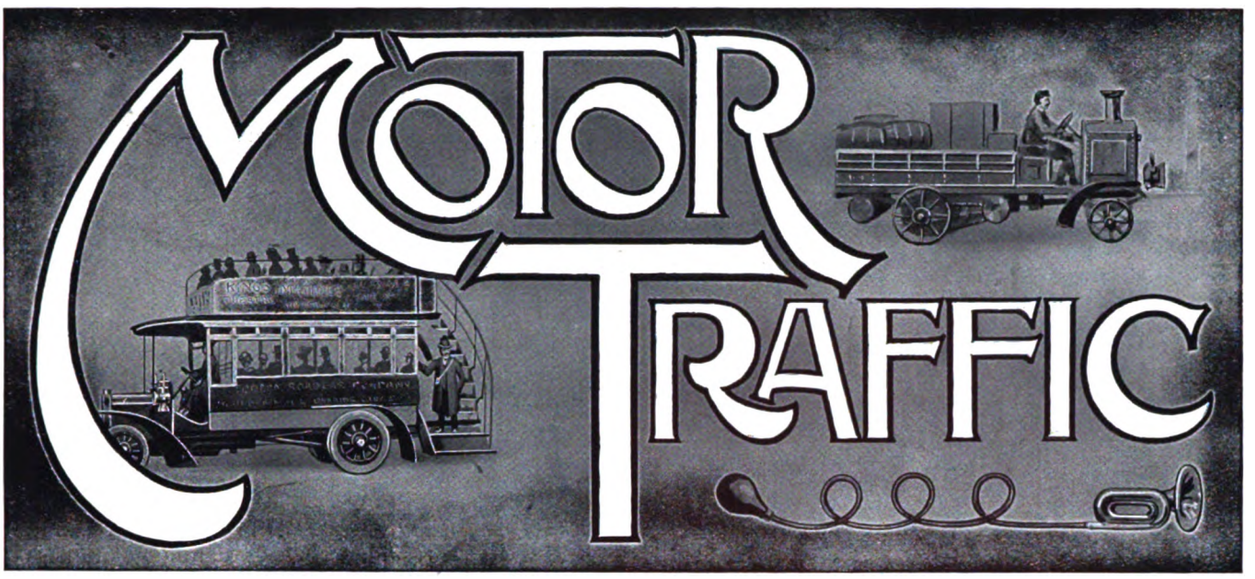

Some restriction has been caused in the sources of supply of public passenger and commercial motor vehicles by the War Office having taken over the entire output of more than one works. Doubtless there will be immediate enlargement of some of the factories, but in a skilled business of this description the greatest difficulty is the provision of mechanicians. An inducement to manufacturers to carry out extensions of their works is to be found in the possibility of securing business that formerly went to German makers. In the public passenger and commercial vehicle departments the German machines have not constituted a serious inroad upon British trade, despite the encouragement that Germans receive from their Government and from the absence of import duties in our ports. It is to the excellence of the workmanship of the British vehicles, made by firms who have specialised in such vehicles from the beginning, that our pre-eminence in this department is due, and when peace is declared after this most calamitous of all wars British traders and others ought to need no exhortation to discharge the duty of supporting home industries exclusively. There are more than a dozen firms in Germany who manufacture both pleasure cars and commercial vehicles, while Austria possesses two. Manufacturers in the former country, whose despotic rulers have plunged Europe into war, possess the advantage of a much more liberal subsidy scheme for lorries and tractors suitable for military use than is offered to British makers and users.

As motor transport has proved a vital factor not only for ensuring rapid mobilisation, but for transporting troops, etc., to the theatre of war, and for the removal of the wounded, the Mechanical Transport Committee of the War Office have every justification for at once considering whether some of the criticism evoked by our own subsidy scheme cannot be met to the advantage of all parties. Properly worked, the Government subsidy to the purchaser should have the effect of removing all and every temptation to the British user to purchase a foreign vehicle. When the scheme is amended to achieve that patriotic purpose, every British manufacturer, instead of only half a dozen, will find it to his interest to build his vehicles in conformity with the War Office requirements.

It is significant of future possibilities to note that in the year 1912 our imports from Germany in motor cars, chassis, and motor cycles were of the value of £1,298,608. Not far short of a score of German firms have been represented in this country, while the German makers of such accessories as taxi-meters, lamps, horns, tool kits, foot pumps, and car clocks literally flood our markets. The Society of Motor Manufacturers and Traders, with characteristic promptness and enterprise, have appointed a representative committee to communicate with British electrical firms in order to promote the home manufacture of magnetos. The necessity for this step is shown by the statement that 80 per cent. of British-made cars are fitted with German magnetos, and it is encouraging to learn that the British Thomson-Houston Company are already producing these articles equal in accuracy of workmanship to the best of the imported magnetos.

Motor vehicle owners who were affected by the impressment may congratulate themselves upon having been the means of rendering supreme service to the Empire, for with the aid of their conveyances the Expeditionary Force was enabled to reach its place on the frontier at a critical moment. In addition to what was said of the London General Omnibus Company in our issue of August 14, it is of interest to record that, commensurate with their position as the largest road transport undertaking in the United Kingdom, the company have made the premier contribution both in vehicles and men. More than 3,000 of the latter were recalled to the Navy and Army, or joined the Motor Transport Service, from what the always apposite advertisement writers of the company have termed the "Nation's Land Fleet." Half of that number were drivers. The call made upon the company both for men and vehicles has demonstrated the efficiency of their organisation to provide what Sir Albert Stanley, at the presentation made to him by the employees of the allied traction undertakings, termed an ideal service in the greatest of the world's capitals. No time was lost in drafting contingents of conductors into the driving school, and the crisis also served to prove the incalculable value of the company's works for speedily replacing the omnibuses and lorries requisitioned by the Government.

The Bristol Tramways and Carriage Company was another undertaking that gave largely of their men and vehicles for war service, which, indeed, necessitated the calling up of hundreds of public service and commercial

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MOTOR TRAFFIC.

machines for the conveyance of men and stores to the ports. Hundreds of them, too, were shipped to France for similar service from Boulogne to the front, where many are now being utilised as ambulances. So hurriedly were they brought into use that the bodies retained the inscriptions of their civil use. One of the British correspondents wrote that "it was like a dream to see a W and G taxi-cab travelling along full of officers, and to take note of the names on the motor lorries and vans." In support of the determination that business should proceed as usual, the various firms have lost no time in taking steps to make good the deficiencies in their means of transport, while others who have lost horses only have doubtless turned their attention to motor vehicles. Those who have not already done so would do well to apply to any of the manufacturers whose announcements appear in the Motor Traffic section of this journal, for they can rely upon obtaining from them trustworthy statements of working and maintenance costs.

Despite the fierce competition there is no place so easy of entrance to the provider of transit facilities as is the metropolis of this country. As long as certain regulations as to the weight of vehicles and the absence of noise in working are complied with, licences may be obtained for one motor stage carriage or for 1,000. Some of the provincial proprietors of chars-a-bancs might find openings for an extension of their enterprise to London if they were able to secure a sufficient number of vehicles, even at this period of the summer. The London job masters cling to their four-horse chars-a-bancs with a persistency that the wide-awake provincial caterer for outing parties would deem to be worthy of the days of the stage coach. Something towards filling the gap is done by the big companies, such as the London General Omnibus and Tillings, but their pleasure vehicles do not ply for hire. The latter department might fittingly be made an adjunct of one or more of the motor cab companies, who of late years have found their business unprofitable owing to excessive competition and labour troubles. This two-fold drawback led one of the companies in the early part of last year to substitute van for cab bodies on a large number of chassis, and to provide the metropolis with a much-needed express parcels service. It would entail a larger outlay to acquire a few chars-a-bancs, but the change would prove profitable in view of the business that is waiting to be cultivated, especially as provincial owners work on an average fare of less than one penny per passenger-mile.

The opening of a subscription by the Royal Automobile Club with a contribution of £500 towards the sum required for investigating the possibilities of alcohol as a fuel for internal combustion engines is of special interest to three classes of our readers. Municipal tramway authorities who operate motor omnibuses, officials of surveyors' departments which use industrial utility vehicles, company undertakings which are becoming increasingly interested in public service motor conveyances, and the private individuals who run both classes of machine would all do well to consider the importance of the appeal. The document is signed by the Hon. Arthur Stanley, the chairman of the Royal Automobile Club and of the Imperial Motor Transport Conference, under whose auspices the investigation is taking place, as the result of the meeting of the latter body in London last summer. The appeal has been supported in letters published in the Press from Prince Arthur of Connaught, ex-chairman of the Club, the Marquis of Crewe, and Mr. Lewis Harcourt, Secretary of State for the Colonies. The latter, a member of the Government, regards it as a matter of the greatest importance that a motor should be devised which can be driven by alcohol fuel, and that some efficient means should be found for denaturing the alcohol to be used as fuel. Mr. Harcourt further observes that if the inquiries meet with success alcohol can be produced very cheaply in our tropical African Colonies for the purpose, and the problems of transport, which are at present a great obstacle to the development of possessions in tropical Africa, would find their solution. While the Colonial Secretary's communication is of value as an indication that the Government are alive to the importance of removing the restrictions that beset the manufacture of industrial alcohol in this country, it is to be hoped that the Colonial Office will not rest content with a bare expression of their sympathy with the object of the inquiry.

EFFECT OF RIVALRY AT WEST HAM.

Increased Track Renewals Due to Motor Traffic.

For the year ended March 31 the income from the West Ham Tramways exceeded the expenditure by £17,798, and was £11,829 less than in the preceding year. After payment of the loan charges there was a net deficit of £14,422. The reserve and renewals fund stood at £32,740, and it had again been found necessary, the treasurer states, to realise part of the investments to cover the cost of renewals. After these realisations the investments on March 31 last stood at £21,177. No part of the fund had been specifically earmarked as reserve, and the fund was not up to the 15 years' standard for renewals. It has been decided that a sum equal to a rate of 2d. in the £ shall be raised next September, and that £4,000, the balance of the deficit, be charged to the reserve and renewals fund.

Mr. J. S. D. Moffet, the general manager, in his report, adverting to the deficit of £14,422, observes that during the year £4,532 was spent on track renewals, whilst the total of the ordinary permanent way repairs was £17,502. This £22,034 spent on track maintenance compares with £14,061 and £8,799 respectively for the two preceding years. The wear and tear of the track was largely due to exceptional vehicular traffic, consisting of traction engines and trailers, and the many classes of petrol-propelled vehicles. The enormous volume of traffic passing over the West Ham roads is reflected by the cost of the upkeep of the permanent way for the year, which works out at the extraordinary figure of £733 per mile of single track. Passengers carried during the year numbered 41,152,502, and £142,635 was paid in fares.

Mr. Moffet adds: "Since the report of the Select Committee on Motor Traffic was issued on August 11, 1913, numerous meetings have been held by local and road authorities in the metropolitan area, including a conference between the executive of the Municipal Tramways Association and representatives of the whole of the London tramway systems, at which resolutions were unanimously adopted urging the Government to pass into law a bill giving effect to the recommendations of the Select Committee with regard to setting up a new department, which should combine the traffic duties of the Home Office, the Local Government Board, and the Board of Trade. Although Cabinet ministers have openly expressed sympathy with the recommendations in the House, and promised that the matter should have the serious consideration of the Government, it is to be regretted that no definite action has yet been taken. Should a new traffic department eventually be formed, or road maintenance grants be made by the Road Board owing to the destruction of the roads by heavy motor vehicles, tramway undertakings in the London district will no doubt receive considerable benefits instead of having to relieve the various communities of large sums in upkeep of the main roads, as has been the case during the past 10 years, due chiefly, of course, to antiquated and out-of-date legislation which Parliament had no desire to revise until outflanked by the wealthy combine, whose operations are subsidised in a manner far in advance of anything that has been done to assist municipal tramway systems."

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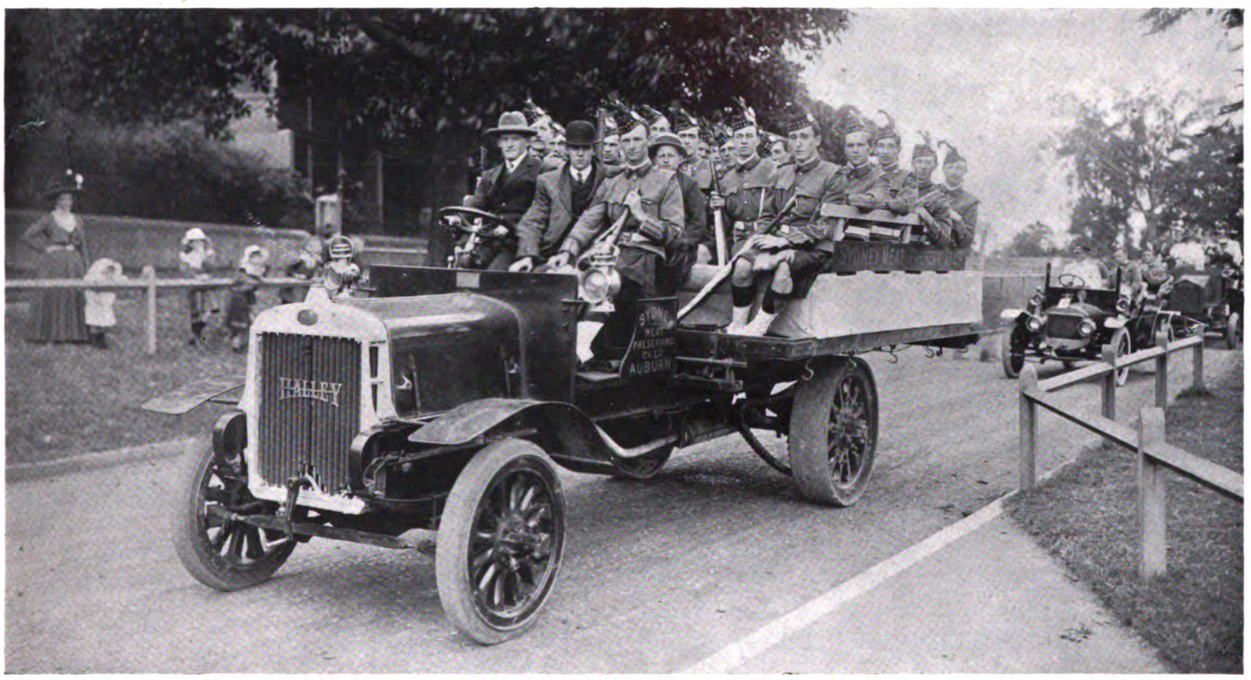
MOTOR TRAFFIC.

MOTOR VEHICLES IN THE WAR.

As advices received from the manufacturers prove the demand for motor vehicles for war purposes has had a remarkable effect upon the commercial motor industry, its resources will be taxed to the utmost for some time to come in order to replace the vehicles which have been pressed into Government service. Although it is quite impossible to get anything like reliable information as to the number of vehicles which have left our shores, evidence from various sources confirms our opinion that an enormous fleet of vehicles has been collected from all parts of the country, and after being used for the purpose of conveying supplies for the Expeditionary Force, have been shipped, together with the equipment required for our Expeditionary Forces, to the Continent, where they are now in constant use by the army transport divisions. Moreover, the demand for vehicles for this purpose is still considerable, as will be gathered from the statements of makers given elsewhere in this issue, while many owners appear to be uncertain as to how long they will be allowed to retain their machines before the requisitioning officer makes known his requirements. From enquiries we have made, it is obvious that while the pleasure car side of the industry has received a set back, as a consequence of the war, from which it will take a long time to recover, the manufacturers of all types of industrial vehicles have a most strenuous time ahead in their endeavour to meet the exceptional demand upon their output. Quite apart from the War Office requirements, as expressed to the manufacturers direct, and through their agents, whole fleets of machines have been commandeered from each of the large carrying companies, municipal authorities, etc. As may be expected, this has seriously interfered with the various public services, and every endeavour must now be made to replace the commandeered vehicles as quickly as possible, but we are afraid little progress can be seen in this direction until something like finality can be reached in regard to the Government requirements. The present situation is further complicated by the sudden conversion to a belief in the value of motor vehicles for trade purposes of the horse owner, the conversion being brought about by reason of the fact that all his draught horses have also been commandeered by the War Office. Fortunately, however, the requirements of the late horse owner can be met as a general rule with a lighter type of machine than those in special demand by the War Office, whilst the reliable firms who can supply vehicles for useful loads of from 10 cwts. to two tons are more numerous than those who specialise in heavier machines. It is an ill wind that blows no one any good, and there can be no question that the disastrous but inevitable war in which this country is now engaged has brought about a state of activity in the commercial motor industry that will last for years, and, indeed, is calculated to bring about immediate changes in transport services that would probably, under normal conditions, have taken years to achieve. One point we would specially emphasise, and that is the necessity for the large number of municipal authorities and others who have the control of public motor services to make known their requirements without delay, in order that the manufacturers may have an opportunity of arranging for an output that will meet the extraordinary demand in a manner that will give satisfaction to all concerned.

HALLEY WAGONS TRANSPORTING TROOPS.

The illustration below shows one of the three Halley wagons supplied to the Sydney Meat Preserving Company, Limited, in August, 1910, which have been requisitioned by the authorities for the transportation of Australian troops destined for service in the present campaign. At the outbreak of hostilities the Australian Government offered a large contingent of its troops for the purpose of upholding the honour of our Empire. The acceptance of this offer necessitated the formation of a suitable military transport service, and, as in the home country, motor vehicles are taking a most prominent part in this all-important duty. Fortunately, a large number of first-class British machines have been imported into Australia, so that no difficulty has been experienced by the military authorities in providing ample transport facilities.



Australian Troops Transported by Halley Lorries.

Messrs. Halleys state that quite recently they received a report with regard to the condition of these machines after their four years' work, which stated that they continued to run as well as ever.

TRAMWAY AND MOTOR 'BUS MEN AND THE WAR.—We are informed that out of a total of 12,000 employees in the tramways department of the London County Council, approximately 700 have been called up to the reserve. In addition to these there are 100 men in the National Reserve, who have not yet been mobilised. The London General Omnibus Company have had 2,000 men called up from all grades, 50 per cent. being drivers. This is accounted for by the fact that, in addition to the reservists, a large number of the men had engagements as military transport drivers. Neither the tram nor 'bus services have been materially affected, despite this large call upon the staffs.

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MOTOR TRAFFIC.

OMNIBUS RESULTS AT SHEFFIELD.

LOW WORKING EXPENSES.

The annual report of the Sheffield Corporation Tramways contains full details of the working of their motor omnibuses. The passenger receipts were £9,128, and the working expenses £5,974. Adding to the latter sum £1,360 for depreciation, which has been calculated on a five years' basis, there remains a net revenue of £1,794. After allowing for interest, sinking fund, and income tax, there is a balance of £1,271, which has been transferred to a special reserve fund to meet any future contingencies. This has been the first complete year of the motor omnibus service, and during the past session of Parliament the Corporation Bill was passed which will enable them to run omnibuses on all the main outlets from the city with one exception. The department is now working 13 omnibuses, and six others have just been ordered. The following shows the average figures of income and expenditure per omnibus-mile for the year, and should be of much interest, especially as the working expenses are so low, and evidently quite comparable with those of the London General Omnibus Company, which operates, of course, on an enormous scale:

AVERAGE PER OMNIBUS-MILE FOR YEAR ENDED MARCH 25, 1914.

	d.
Traffic revenue	10·200
Total expenses	8·779
Balance to reserve fund	1·421

DETAILS OF EXPENDITURE.

	d.	d.	
Traffic expenses:			
Wages of drivers and conductors	2·343		
Cleaning and oiling omnibuses	·503		
Other traffic expenditure	·437		
		3·283	
General expenses:			
Salaries of staff	·132		
Other expenditure	·198		
		·330	
Repairs account:			
General repairs and maintenance, including tires		1·221	
Power expenses:			
Petrol		1·841	
Total working expenses			6·675
Interest and sinking fund			·482
Income tax			·102
Renewals fund (depreciation on omnibuses)			1·520
Total expenditure			8·779

OMNIBUSES SUGGESTED FOR TORONTO.

"The Motor Omnibus as a Solution of Toronto's Transportation Problem," was the subject of an address recently given to the members of the Toronto Motor League by Mr. O. Hezzelwood, of the McLaughlin Automobile Company. He estimated that the cost of installing an experimental service would be as follows:

20 omnibuses, London type: annual charges for operation, management, insurance, depreciation, and interest	$166,000·00
Revenue from operation of 20 omnibuses, 3½ cents each trip	195,500·00
Profit	$29,500·00

In considering a public utility, however, it was well to remember that convenience, accommodation, and safety could not be expressed in terms of commerce. While the expense of operation of omnibuses was greater by ½ cent a mile, the time made by omnibuses was so much better, that the tramcar cost its patrons about 11 per cent. more than the motor omnibus. Extra time spent in street cars did not contribute to health, recreation, pleasure, or wealth. If the average trip of the Toronto passenger was three miles, then Toronto's 151,236,925 passengers in 1913 lost 756,184 days of 10 hours each, which at an average of 50c. a day amounted to $378,092·00.

Another loss street cars imposed upon the public was found in the ratio of obstruction to the general traffic. A 70-passenger tramcar caused 3⅓ times the obstruction that a 34-passenger 'bus caused. If all their passenger traffic were carried on omnibuses, there would only be 48·90 of the present obstruction to the general public. The saving by changing over the Toronto system, even at an average lessened delay of 15 minutes to each unit, would amount to a large item—possibly enough to pay interest and a good sinking fund on the initial outlay.

The accident record in London was no valid objection. The tramways were excluded from the congested districts. The motor omnibus was a new means of transportation, and experience had proved that when the public becomes acquainted with conditions, the ratio of accidents was greatly diminished. London figures showed a reduction of fatalities of 75 per cent. in three years. He had figured out that the London motor omnibus was only one-sixth more fatal than Toronto cars. Twenty-five per cent. of the fatal accidents occurred to cyclists who slipped and fell under the rear wheels of the omnibuses. Many accidents were caused by pedestrians suddenly stepping off the kerbs. Strange as it might seem, the element of speed did not appear to be a factor in causing accidents.

DAIMLER MACHINES FOR THE WAR OFFICE.

The illustrations given here represent a number of 3, 4, and 5-ton lorries which were impressed by His Majesty's Government for War

Daimler Chassis Commandeered.

Office use. In the first picture the chassis are assembled as inspected by the Military authorities, and in the second illustration the same machines are shown fitted with lorry-type bodies and canopy over the

Daimler War Office Machines Ready for the Road.

driver's seat. An interesting circumstance in connection with these illustrations is the fact that only two days elapsed between the taking of the two photographs.

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MOTOR TRAFFIC.

A STAR CARRIER SERVICE 'BUS.

The Star Engineering Company, Limited, of Wolverhampton, have recently supplied a single-decked omnibus for service in the Peppard and Reading district. The machine, which is designed to carry both

passengers and luggage, has seating accommodation for 24 passengers, the seats being made to fold so that the luggage-carrying capacity can be increased as desired. All the windows are made to open, and a glass wind screen affords protection for the driver and the two passengers for whom there are seats outside.

BRISTOL HOLIDAY TRAFFIC.

A Record Motor Coach Tour.

The motor omnibus and tramway car traffic on the August Bank Holiday was not quite up to that of last year. Several reasons may be given to account for this, one being the adverse weather, the more serious, however, being the war cloud. The busiest services were those running in connection with the Exhibition. The country omnibus services were well patronised, the vehicles on several routes being run in pairs. The torpedo chars-a-bancs tours were well patronised, seven vehicles running to Wells and Cheddar carrying 172 passengers and two to Castle Combe and Bath carrying 44 passengers. One started on a three days' tour through Devon and Cornwall.

On the previous day, Mr. Chas. Challenger, accompanied a tour on the longest journey yet undertaken in one day, two well-filled 22-seat torpedo chars-a-bancs running to the distant South Devon seaside pleasure resorts of Budleigh Salterton and Exmouth. Numerous runs have been made to Bournemouth, Weymouth, Lyme Regis, Sidmouth, and Seaton on the southern coast, the to-and-fro mileage extending to upwards of 165 miles, but this latest tour to Budleigh Salterton and Exmouth totalled 183 miles. The tour occupied 14¼ hours, starting from Tramways Centre at 8-45 a.m. and arriving back at 11 p.m. Such an achievement speaks eloquently as to the perfection to which the petrol vehicle has attained. On arrival home the passengers expressed themselves as being delighted.

Loans Sanctioned for Traffic Facilities.—The Board of Trade have sanctioned the borrowing of £4,000 for the installation of a railless trolley system by Ardsley Council. Sanction has been given to the borrowing of £21,800 by Baildon Urban Council for the construction of tramways.

"Safety First" Movement at Montreal.—The "safety first" movement inaugurated by the superintendent of the Montreal Tramways Company has received the approval of the Mayor and the City Council. Councillor Hebert described the campaign as "admirable," and said that it would ensure greater security for the citizens. Much credit was due to Mr. Arthur Gaboury, superintendent of the Montreal Tramways Company, for his initiation of the plan. It is felt by the tramway authorities that the official sanction given to their efforts will be of great assistance to them.

WAR ITEMS.

A number of "**Tilling-Stevens**" petrol-electric machines have been in the service of the War Office for some time, the electric transmission offering important advantages in addition to supplying power for propelling the vehicle. Some of the uses to which the machines can be put are supplying current for machine tools in portable repair shops attached to transport column, electric welding, and searchlight work, thus rendering it unnecessary to transport special generating sets for these purposes. The output of the 40-H.P. machine is approximately 30 KW. Special cooling arrangements, including the Solex radiator, are provided, which enable the engine to run for long periods without the risk of over-heating.

Messrs. Wakefield and Company, the well-known manufacturers of "Gear Ease," are keeping on full pay all the members of their staff who are serving with the Army and Navy, and will reinstate them on their return from the war.

Leyland Motors, Limited, as a result of the war, had to postpone their holiday week. All the employees will, however, receive a week's holiday at the close of the war, with full pay. The men are now working at full pressure, a separate night staff being also found necessary in order to cope with the Government's demands.

Halley's Industrial Motors, Limited, are now able to assure their customers that all orders can now be dealt with as in the ordinary course of business.

A Number of London Omnibuses have been fitted with ambulance bodies, and are now employed conveying injured sailors and soldiers from Harwich to Netley and other hospitals.

The Avon India Rubber Company have received a report from the Sheffield-Simplex Motor Works with regard to the recent test of hauling heavy guns by their motor cars fitted with Avon tires. It is satisfactory to learn that although the test was exceptionally severe the tires showed not the slightest sign of wear or damage.

Westminster City Council offered the whole of their fleet of modern motor vehicles to the War Office immediately the order for mobilisation was given.

Carter, Paterson, and Company, Limited, had a large fleet of their vehicles commandeered, including 41 Thornycroft vans which had recently been delivered.

The British Electrical Federation employees are systematically contributing to a fund from which support will be given towards the maintenance of dependents of their fellow workers who have been up for service with the Army or Navy. It is understood that each of the companies included in the federation will contribute an equal amount to that raised by their employees.

The Underground Electric Railway Combine, whose employees have adopted a similar scheme to that noted above, will also contribute an amount equal to the men's contributions.

Leeds City Council, having lost a number of the horses from the cleansing department, which have been taken for military purposes, are now replacing them with motor street sweeping machines.

Bradford Corporation had their two Yorkshire steam wagons taken over by the Army Service department of the War Office.

The Government has withdrawn its proclamation against the export in so far as it applied to chassis with a carrying capacity of 25 cwt. and above.

The Daimler Company delivered 80 three-ton lorries complete with bodies to the War Office in 14 days from the receipt of the order.

The Bristol Tramways and Carriage Company, Limited, placed practically the whole of its fleet at the disposal of the War Office. Their operations were confined to local service, and have not been commandeered.

The London General Omnibus Company informs us that a large number of new drivers are being trained in their school to replace the 1,500 who in one form or another are now serving the Government, and that they hope shortly to give the full normal services.

The Society of Motor Manufacturers and Traders have lent their council room to the Red Cross Society. They have also contributed £1,000 to the National Relief Fund and a similar amount to the Belgian Relief Fund.

The Manchester Corporation omnibuses have been commandeered by the War Office.

The Commercial Motor Users' Association has undertaken the compilation of complete lists of industrial motor vehicles to be handed to the War Office, and also the enrolment of men willing to serve in the transport companies of the Army Service Corps.

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MOTOR TRAFFIC.

MOTOR TRAFFIC NOTES.

DEWSBURY CORPORATION are purchasing a motor fire engine at a cost of £590.

BRADFORD CORPORATION have decided to purchase a steam motor wagon at the price of £575.

TIPTON URBAN DISTRICT COUNCIL have decided to purchase a motor fire engine at a cost of £496.

TEIGNMOUTH COUNCIL have under consideration a proposal to purchase a motor fire engine at an estimated cost of £775.

SURREY COUNTY COUNCIL have just taken delivery of a 5-ton tipping wagon from Dennis Brothers, of Guildford, Limited.

Dennis Tipping Wagon for the Surrey C.C.

WALLSALL TOWN COUNCIL propose to spend £5,500 in establishing a motor omnibus service to work in conjunction with their tramway service.

HALLEY'S INDUSTRIAL MOTORS.—An interim dividend at the rate of 10 per cent. per annum for the half-year ended June 30 has been declared.

THE DUBLIN CORPORATION have placed an order with Alldays and Onions Engineering Company, Limited, for the supply of a motor watering wagon.

TOTTENHAM URBAN DISTRICT COUNCIL have under consideration the recommendation of the Sanitary Committee for the purchase of a motor ambulance at the estimated cost of £756.

THE DAIMLER COMPANY'S OUTPUT.—It will be of interest for those of our readers who contemplate ordering industrial motor vehicles to know that with their 2, 3, 4, and 5-ton models they have arranged for an output of 50 chassis per week.

REVENUE INCREASED BY OMNIBUSES.—By the running of their new omnibuses to Culter, Banchory, etc., on Sundays, the Aberdeen Suburban Tramways Company have added considerably to their tramways traffic. The omnibus passengers are conveyed to and from the starting points by the company's cars running from inside the city.

ELECTRIC VEHICLE ASSOCIATION, U.S.A.—At the fifth annual convention of this Association, which will be held at Philadelphia, October 19 to 21, 28 reports are to be presented, and there will be eight papers dealing mainly with trucks for industrial purposes, postal, fire service, etc. The offices of the executive secretary is at 29, West 39th Street, New York.

THE BRITISH AUTOMOBILE TRACTION COMPANY are running a very successful service of Daimler vehicles in Macclesfield and district. A complete time table and fare list is published, and a regular service is being maintained between Macclesfield, Leek, Buxton, and Cheadle. The famous Cat and Fiddle Hill is daily negotiated with the greatest ease. The average daily mileage is now about 1,200.

YORKSHIRE MOTOR 'BUS SERVICES.—The Yorkshire (Woollen District) Electric Tramways have entered into an arrangement with the Cleckheaton District Council for an extension of the existing services of motor omnibuses in the districts of Gomersal and Oakenshaw. At the latter point the 'buses will connect with the railless car service of the Bradford Corporation. A number of other services are under consideration, one of them being a through service from Morley to Brighouse.

OMNIBUSES IN RANGOON.—In their report for the past year the directors of the Rangoon Electric Tramway and Supply Company state: "Towards the end of the year the directors commenced a service of motor omnibuses, which in addition to acting as feeders to the tramways, will also, it is hoped, supply a want for transport of a more elastic nature than the tramway service. It would be premature to say what the financial result of motor omnibuses will be. They bid fair to supply a want, but the expenses of operation have yet to be ascertained."

FOLDING TABLE FOR MOTOR CARS.—The General Seating Company, Limited, whose car seats are well known, have just put on the market the patent acme automatic folding table, adapted for a variety of uses. The table can be set up in two seconds and closed in five seconds. It is of light but very rigid construction, and folds up when not in use into a very small space. In can be placed under the seats of a motor car, and can be used in the car by simply folding up the legs. When closed it measures 30 in. long, 14 in. wide, and is only 1½ in. thick, and weighs only 12 lb. When the table is open it measures 5 ft. long, by 14 in. wide, and stands 30 in. high. Any size or quality can be supplied.

PROPOSED OMNIBUSES AT ROTHERHAM.—Rotherham Town Council have adopted a recommendation that the tramway manager should prepare for the consideration of the Electric Light and Tramways Committee a detailed report showing the estimated cost of running motor omnibuses in districts recommended by him, along with the probable revenue in respect of each suggested route. In regard to a proposed motor omnibus service to Catcliffe and Treeton, it was agreed to instruct the town clerk to inform Rotherham Rural District Council that the Corporation were prepared, without prejudice, to pay ⅜ of a 1d. per omnibus-mile run in respect of a motor omnibus which the Corporation intend to run to the places named.

THE THOMAS TRANSMISSION SYSTEM.—The Thomas electro-mechanical transmission system for motor vehicles has in the past been described in THE TRAMWAY AND RAILWAY WORLD, and its high efficiency has been proved by practical experience. Modifications have now been introduced in the mechanism making it lighter, simpler, and more compact. The gears and gear casing are now placed between the two electrical machines used in the system, and the clutches have been redesigned. All the means for control have been grouped on the steering column, and it is exceedingly simple and easy from the driver's point of view. The range of road speeds obtainable is very large; in fact, tests with a pleasure car fitted with the Thomas mechanism showed a range of from one to 60 miles an hour.

A CENTRAL TRANSPORT EXCHANGE.—A large number of firms are at the present moment in difficulties owing to their horses or motor vehicles having been requisitioned for military service. Many others find it impossible for them usefully to employ their vehicles or horses. The Imperial Motor Transport Council has opened at 173, Fleet Street, London, E.C., a central transport exchange for the purpose of bringing those who are short of delivery facilities into touch with those who are short of work for their vehicles for the time being. A considerable number of enquiries have already been dealt with, and a number of firms put into touch with others who are prepared to hire or buy their vehicles. All enquiries should be addressed to Horace Wyatt, hon. sec., Imperial Motor Transport Council, at the above address.

GUARDS FOR MOTOR OMNIBUSES.—The ratio of motor omnibus accidents to the mileage run shows that the danger from the omnibus is increasing and that the motor omnibus has become the most dangerous vehicle in public service. It may be expected, however, that the forthcoming year will show a considerable diminution in the number of accidents, for the omnibus companies are taking greater precautions than ever before. Some time ago suggestions were invited by the London General Omnibus Company for designs for a front life-guard. It is reported that no fewer than 5,800 designs were submitted to the engineers, but none of these have been considered sufficiently practicable, although experiments with a few of them are still being continued. The protection now afforded to the rear wheels has been useful, although it leaves much to be desired. All protection that seems to be necessary in front is protection from the wheels, and the problem of designing an efficient and reasonably economical device should not be insoluble.

THE "BURFORD" 2-TON CHASSIS.

A new 2-ton machine of American manufacture has now been placed on the British market, its sale being in the hands of the Automobile Consolidated Alliance, Limited, of Albermarle Street, W. Although built in America, the design of the chassis is distinctly British, and embodies a number of features which clearly indicate a careful study of the conditions under which motor vehicles are operated in this country. The chassis takes its name from that of the managing director of the Automobile Consolidated Alliance, Limited, Mr. H. G. Burford, whom our readers will recognise as one of the earliest of those associated with the industrial motor industry; his experience should be of value to all prospective users of these machines. Simplicity and strength appear to us to be the outstanding features of the chassis, and we feel sure that it will be to the advantage of those interested in mechanical transport to obtain particulars of its design.

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THE

Tramway & Railway World

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Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

COLWYN BAY AND COLWYN URBAN DISTRICT COUNCIL.

REFUSE DESTRUCTOR.

The above Council are prepared to receive tenders from experienced firms for the erection of a Refuse Destructor, with Steam Boiler, Auxiliary Machinery, etc., complete.

Copies of the general conditions, specification, form of tender and plans, may be obtained from the Consulting Engineer, Mr. E. M. Lacey, M.Inst.C.E., 12, Victoria Street, Westminster, S.W., on payment of a deposit of five guineas, which will be refunded on receipt of a *bona-fide* tender. Duplicate copies can be obtained on payment of one guinea, which will not be returned. Any further particulars may be obtained from Mr. William Jones, Assoc.M.Inst.C.E., the Council's Engineer and Surveyor, Council Offices, Colwyn Bay.

Tenders must be in the form attached to the specification, and must be delivered to me not later than 11 o'clock in the forenoon on Thursday, the 8th day of October, 1914, in sealed envelopes, endorsed "Tender for Refuse Destructor."

The Council do not bind themselves to accept the lowest or any of the tenders sent in.

JAMES AMPHLETT,
Clerk to the Council.

Council Offices, Colwyn Bay,
September 2, 1914.

ELECTRIFICATION OF MELBOURNE SUBURBAN RAILWAYS

The Agent-General for Victoria, Australia, is prepared to receive tenders for the supply and delivery in Melbourne of :—

Three-Phase Motors for Driving Workshop and other Machinery for use in connection with the Electrification of the Melbourne Suburban Railways now being carried out.

Specification and form of tender may be obtained from Messrs. Merz and McLellan, Consulting Engineers, 32, Victoria Street, Westminster, S.W., on or after Monday, September 7, 1914. Any *bona-fide* tenderer requiring information in addition to that contained in the specification may apply to Messrs. Merz and McLellan.

The charge for the specification in duplicate is £5 5s., and £2 2s. each for any further copies.

Sums paid as above will be refunded on receipt of a *bona-fide* tender for the whole of the works included in the specification.

The cheques which must accompany applications for the specification are to be crossed and made payable to the Agent-General for Victoria.

Sealed tenders, marked "Electrification of Melbourne Suburban Railways—Tenders for Three-phase Motors for Driving Workshops and Other Machinery," are to be addressed to the Agent-General and delivered at his office, Melbourne Place, Strand, W.C., not later than 12 noon on October 12, 1914.

The Government do not bind themselves to accept the lowest or any tender, and ample security will be required from the contractor whose tender is accepted.

SOUTH INDIAN RAILWAY COMPANY, LTD.

The South Indian Railway Company, Limited, are prepared to receive tenders for the supply of :—

1. Steel Rails 41½lbs., and Fishplates, about 1,790 tons.
2. Screw Spikes No. 245, 700.
3. Bridgework, about 59 tons.
4. Steel Bearing Plates, about 31 tons.

Specifications and forms of tender may be obtained at the Company's Offices.

Tenders addressed to the Chairman and Directors of the South Indian Railway Company, Limited, marked "Tender for Steel Rails and Fishplates," or as the case may be, must be left with the undersigned not later than 1 o'clock on Wednesday, September 30, 1914. The Company is not bound to accept the lowest or any tender.

A charge, which will not be returned, will be made of 40s. for each copy of specification No. 1 and 10s. for each copy of Nos. 2, 3, and 4.

Copies of the drawings may be obtained on payment at the Office of Robert White, Esq., M.Inst.C.E., Consulting Engineer to the Company, 3, Victoria Street, Westminster, S.W.

By order, V. E. DE BROE, M.Inst.C.E.,
For Managing Director.

Company's Offices,
91, York Street, Westminster, S.W.,
September 3, 1914.

COUNTY BOROUGH OF WALSALL.

The Walsall Corporation invite tenders for the supply, delivery, and erection of :—

Section 1.—Extra High Tension Switchgear.
Section 2.—Static Transformers.
Section 3.—Low Tension Switchgear.

Copies of the specification, formal conditions, etc., may be obtained upon application to the Consulting Engineer, Mr. E. M. Lacey, M.Inst.C.E., 12, Victoria Street, Westminster, London, S.W., on payment of three guineas, which will be returned on receipt of a *bona-fide* tender.

Extra copies of the specification may be obtained on payment of half a guinea which will not be returned.

Tenders, sealed and endorsed on the outside "Tender for Electricity Works Contract No. 5," to be addressed to the Town Clerk, Walsall, and delivered not later than 10 a.m. on Tuesday, September 29, 1914.

The Corporation do not bind themselves to accept the lowest or any tender, and they will not accept the tender of any firm or person paying less than the standard rate of wages to their workmen.

By order, HERBERT LEE,
Town Clerk.

Council House, Walsall,
September 7, 1914.

WHITBY URBAN DISTRICT COUNCIL.

TO CLIFF TRAMWAY AND LIFT MANUFACTURERS.

The Whitby Urban District Council contemplate the provision of a Cliff Tramway, or a Lift, from the beach to the top of the cliff, and invite schemes, with quotations, for the execution of the work.

The undercliff measures—at probable position of tramway or lift—about 250ft. horizontally, and 130ft. vertically.

Schemes and quotations must reach the Clerk to the Council before September 30, 1914.

The Council do not bind themselves to accept any tender or scheme.

THOS. KEAT SCOTT,
Surveyor.

Offices of U.D. Council, Whitby, Yorks,
August 13, 1914.

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URBAN DISTRICT COUNCIL OF CHISWICK.

TO MOTOR TRACTION CONTRACTORS.

Persons desirous of tendering for the supply of One Three-Ton Petrol Motor Lorry, with Detachable Bodies and Tanks, to carry House Refuse and Slop, may obtain forms of tender and copy of specification by application to Mr. E. Willis, A.M.I.C.E., Surveyor, Town Hall, Chiswick.

Tenders are to be made on the prescribed forms, and to be delivered in sealed envelopes, endorsed "Motor Lorry," to the undersigned not later than 4 p.m. on Wednesday, September 30, 1914.

ERNEST F. COLLINS,
Clerk of the Council.

POSITION VACANT.

BOROUGH OF OSSETT.

FIRE BRIGADE.

Wanted, an experienced Motor Fire Engine Driver to act as Storekeeper at the Corporation Depôt. Applicants should have a good practical knowledge of motor fire engines and repairs.

Wages 30s. per week, with house, coal, and gas free.

A list of duties may be obtained from the undersigned.

Applications, together with copies of two recent testimonials or references, to be forwarded to T. W. Wilson, Esq., Town Clerk, Ossett, and endorsed "Motor Fire Engine Driver and Storekeeper," not later than 10 a.m., September 14, 1914.

H. HOLMES, M.Inst.C.E.I.,
Borough Surveyor.

September 2, 1914.

Telegrams: KRANKASES. Telephones: {4879 CENTRAL. {3846 CITY.

ALUMINIUM CASTINGS

COAN CASTS CLEAN CRANK CASES

MADE and REPAIRED.

FOR ALL TRADES. | LARGE AND SMALL. | PURE AND HARDENED.

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R. W. COAN, THE ALUMINIUM FOUNDRY,
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Tramway Engineers,
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Sole Manufacturers of
TURNER'S PATENT AUTOMATIC POINT CONTROLLERS.
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which keep their colour and prevent rust. Kearsley's ready-mixed Pole Paints are used by important Tramway Companies the world over, and give entirely satisfactory results under extreme climatic conditions.

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THE SANITARY WOOD PAVING
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GARRISON LANE, BIRMINGHAM.

Makers of Simplex Steel Conduit System and

WIRES and CABLES.
BITUMEN CABLES.
TRAMCAR HEATERS.
TRAMCAR METERS.
MEASURING INSTRUMENTS.
WATERTIGHT FITTINGS FOR CAR SHEDS.
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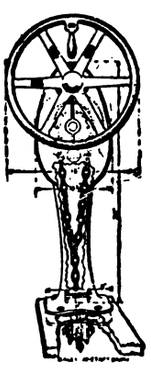

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WESTINGHOUSE BUILDINGS, NORFOLK STREET, LONDON, W.C.
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Ackley Adjustable Brake.

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Deutsche Ackley Bremsen Co., m.b.H. Charlottenburg 4-Berlin, Waitzstr. 7.
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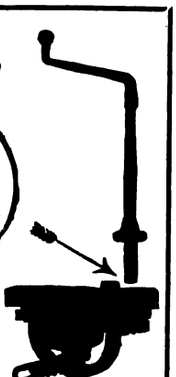

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THE
Tramway AND Railway World

Established in 1892 and Published by

THE TRAMWAY & RAILWAY WORLD PUBLISHING CO., Ltd.,
AMBERLEY HOUSE, NORFOLK STREET, LONDON, W.C.

Sixty-four issues are published annually, including twelve large numbers which are fully illustrated and printed on art paper.

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FOR THE UNITED KINGDOM—Twenty-five Shillings per annum including 64 issues, of which 12 are illustrated numbers.
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FOR ALL PLACES ABROAD—Thirty Shillings per Annum.

SATURDAY, SEPTEMBER 12, 1914.

THE "OCEAN"
ACCIDENT AND GUARANTEE CORPORATION, LTD.,
IS THE
PREMIER INSURER OF TRAMWAYS
HEAD OFFICE:
MOORGATE STREET, LONDON, E.C.

THE TRANSFER OF GERMAN TRADE.

In the electrical, as well as in other industries, instances continue to accumulate of British customers cancelling contracts with German firms and placing orders with home manufacturers for the goods required. Frequently, the buyer or the contractor has no desire to make the circumstances public, and it is quite certain that the number of such cases and the value of the orders are much greater than any published statement indicates. An example of the sort of thing which is going on was given in a note in our issue of last Saturday, which stated that the Bradford Electricity Committee had cancelled a contract for a 5,000 kw. turbo-generator with a German firm and had given the order to the British Westinghouse Company. This order alone runs to a figure of something like £10,000. Where the buyers in this country are companies or private firms the public are not so directly concerned as where the purchasers are Government departments or municipalities. But in both cases it is to be hoped that the lesson will be taken to heart. Why should the State or local authorities, even in times of peace, go to foreign manufacturers for goods or apparatus which can be produced in this country? The answer has been that the foreign equipment is cheaper, but to that has to be added the fact that it is generally inferior. The unfairness to the British manufacturers is crowned when, as is so often the case, the State or the municipality asking for tenders stipulates that trade union hours and rates of wages must be observed in connection with the men carrying out the contract. In the case of a foreign firm the hours and wages are very different from those in this country, and they enable the foreigner to undercut the British contractor in price, even if quality of material and workmanship were equal. The present war is not going to be speedily over, and before it is finished and especially before German manufacturers are again in a position to compete in the world's markets, there will be ample time for British buyers of electrical machinery to re-acquire a habit which they should never have lost—namely, to give their orders to their own countryman instead of to foreigners, unless there is some preponderating reason to the contrary. Such a course will also encourage our manufacturers, while they continue their efforts to capture a share of the German export trade. Much is now being done in this direction, but the effort must be determined and persistent if it is to be successful. This is the more necessary as all the indications go to show that the Americans are using every possible effort to secure as much of the trade as possible, and, of course, the more of it they get the less there will be for our people. Probably it will not be possible for some time to gauge what amount of success British manufacturers are achieving in this direction. Although a great deal of Board of Trade and other information as to German export trade is being published and some meetings are being held, the action of companies and firms must to a large extent be individual and private in the first place. Only gradually will it be seen how far on the average and in the mass have they been successful; but the degree of success will mainly depend upon the initiative and enterprise with which our merchants apply themselves to the task before them.

TRAMWAYS AND THE WAR.

BIRMINGHAM.—The number of Birmingham tramway men who have joined the army is now about 600, making the total enrolment for the city 15,000.

LONDON.—Of the 30,000 men employed by the London Underground Railways and the Associated Tramway and Omnibus Companies some 4,000 have already been called away to service in the war. An account has been opened with the London and South Western Bank to receive subscriptions from the officers and employees of the London County Council tramways.

LEEDS.—The officers and staff of the tramways, highways and cleansing departments of Leeds Corporation are working in conjunction with the other employees in these departments to assist the Lord Mayor's Relief Fund, and have decided on weekly contributions on a graduated basis. This will amount in six months to about £1,550.

GLASGOW TRAMWAY MEN.—The total number of employees from the Glasgow Corporation Department who have enlisted for the war is now no less than 1,700. On Monday last about 1,000 of these men—car drivers and conductors—under the charge of Mr. James Dalrymple, the tramways manager, marched to George Square, where in the wide space before the Municipal Buildings they were inspected by Lord Provost Sir D. M. Stevenson. The procession to the square was headed by the tramways department's bagpipe band. In connection with the inspection several speeches were delivered. Mr. Dalrymple said he had great pleasure in asking Bailie Kirkland, convenor of the Tramway Committee, to present to the Lord Provost 1,100 tramway men who had made up their minds to serve their country in the fighting line. Bailie Kirkland thought these men would comprise a battalion, and he suggested that they should be known as the Tramway Battalion. The committee never were prouder of their staff, and he asked the men to take as their inspiration the words of Burns:—

"Lay the proud usurpers low,
Tyrants fall in every foe,
Liberty's in every blow,
Let us do or die."

The Lord Provost, who was accompanied by several of the magistrates and by Colonel Stanley Paterson, chief recruiting officer for Scotland, inspected the men, and said he had never been prouder of the Corporation than that day. They had been trying to raise a Glasgow regiment. The difficulty they were going to have now was to get off with less than three regiments. They had got nearly two battalions already from the tramway department alone, and when he remembered that there were over 20,000 people in the Corporation service he felt that the committee concerned with the work would have to widen its scope. He was sure that the men would distinguish themselves. Bailie McMillan, convener of the committee of magistrates in charge of the Corporation recruiting arrangements, said he believed that before the week was out they would have about 25,000 men apart from Territorials who had joined the various regiments. The Lord Provost, replying to cheers which were given in his honour, said that within a month Glasgow had given five men for every one that was expected as the city's contribution to Lord Kitchener's army.

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RAILLESS TRACTION AT BRADFORD.

The railless system on the section from Laisterdyke to Dudley Hill, Bradford, has now been in operation about three years. Although there is again a loss on the working, Mr. C. J. Spencer, general manager, in his annual report alludes to the feeding value of the route. He does not feel the slightest doubt that if, for example, the last penny stages of the tramway lines were separately accounted for it would be found that they were, on a similar basis, unprofitable. It is, therefore, entirely wrong and misleading to say that the tramway department is losing money on its railless trolley system. The system was put down experimentally and the Corporation has gained considerable experience which could not otherwise have been obtained. Designs for a special type of car were prepared some time ago, and a contract for twenty-eight chassis was placed with Messrs. David Brown and Sons, Limited, Huddersfield. Some of these are now in service on the routes authorised by Parliament in 1912 and 1913, and others will be ready shortly.

Mr. Spencer thinks that the relative merits of railless trolley and motor omnibuses turn, broadly speaking, on the question of running costs. He continues:—"It ought to be possible to construct and operate a railless trolley car, which would run more silently and with less vibration than a petrol-propelled vehicle, and I believe that that has already been achieved by the new cars at present in service, which are running exceedingly well, and give a reliable service to districts where tramway construction was impossible due to the heavy capital expenditure. As matters stand at present, I am of the opinion that railless cars will be operated at a considerably cheaper rate than it would be possible to operate motor omnibuses where there is a service of half-an-hour or less. Where, however, the population to be served is so sparse that only a very slow service can be supported, and where consequently the car mileage is very low, it may be more economical to run a petrol omnibus."

THE NORTHAMPTON TRAMWAYS MANAGER.

Mr. J. Gottschalk, manager of the Northampton Corporation tramways, who is a native of Germany, made the following statement at a special meeting of the Tramways Committee:—

"As various statements have been made respecting my loyalty, I think it is due to the committee that I should put my position before them.

Among the various accusations, it is stated that I attended the Army Manœuvres last year, that I have invested my money abroad, that I have introduced foreign officers and purchased horses for foreign armies. I beg to give all these statements my absolute denial. All the years I have resided in this country, I have never committed a disloyal action to the country of my adoption and, come what may, I never shall. I came to this country before I was eighteen years of age, and have resided here ever since. My wife and children are English and one of my sons has served in the British Army.

As regards naturalisation, I confess now that I have made a mistake, but I never dreamed with our present civilisation such a catastrophe could possibly occur. I may here state that for 20 years past I have lost my German nationality.

I desire to put myself unreservedly in the hands of the committee and to express my feeling of gratitude and appreciation at my reception and treatment in the past, and the encouragement and consideration I have always received at their hands.

In conclusion, I deeply deplore the circumstances which have necessitated a statement of this nature, and I am only too anxious to prove in any way I can, that I am, and always have been, loyal to England and her people."

Councillor T. D. Lewis, chairman of the committee, said that they would always have every confidence in Mr. Gottschalk. The employees had always recognised his energy and sense of fairness, and had received nothing but kindness from him. Mr. Gottschalk had lived for twenty-eight years in Northampton, holding a responsible position, and he trusted that Mr. Gottschalk's statement would allay any fears that had been aroused. While, of course, their feelings were at present naturally antagonistic to anyone of German nationality, as Englishmen they were most anxious to do what was fair and just. Councillor T. D. Lewis stated that Mr. Gottschalk had already applied for naturalisation and he had every reason to believe that this would shortly be granted. The committee will report to the next Council meeting.

Electric Railway Concessions.—The *Journal Officiel* (Paris) of August 25 publishes a decree granting to Messrs. Giros and Loucheur, 69, Rue de Miromesnil, Paris, concessions for the construction and working of a system of electric and steam railways in the Departments of Tarn and Haute-Garonne. The total length of the line will be 164 kilometres (about 102 miles), and the estimated cost 10,461,000 francs (£418,440). The *Journal*, containing the text of the concession (in French), together with the specifications of the lines to be constructed, may be seen by United Kingdom manufacturers and contractors at the Commercial Intelligence Branch of the Board of Trade, 73, Basinghall Street, London, E.C.

New Electric Station at Leeds.—For the purposes of the new electrical generating station the Tramways and Electricity Committee have decided to expend £22,000 on the purchase of land between Aire Street and the River Aire. The sum will include the cost of land off Fountain Street, Morley, for the erection of a car shed and sub-station.

TRADING WITH THE ENEMY BILL.

BRIGHTON RAILWAY CONTRACT WITH ALIENS.

In the discussion on this Bill in the House of Commons on Thursday, Mr. J. M. Henderson remarked that it left out of consideration the case of the limited company, which, if trading as a private firm, would be absolutely alien. An alien firm, by registering as a limited company, could continue to carry on business, although practically all the shareholders might be aliens. There was, for example, the Allgemeine Electricitats Gesellschaft, of Berlin, which has the principal contract for the electrification of the Brighton Railway. About the time that war was declared that company registered a company in England with 30,000 shares, of which they held 29,993, and they registered the company merely for the purpose of keeping their business here alive. It was a case of an alien firm becoming nominally a British company, but being in fact an alien company. The Attorney-General, in reply, said they wanted to take every possible security to prevent the enemy profiting by transactions carried on here, and on the other hand they did not want to interfere with employment in this country or with British interests. One great advantage in treating as a British company a company here which was largely German was that if it entered into commercial transactions with its parent enterprise in hostile territory, it would be committing a crime under this Bill, and could be dealt with accordingly.—Final consideration of the Bill was postponed in order that further consideration might be given to other suggested amendments.

MISCELLANEOUS NEWS AND NOTES.

The General Vehicle Company, Ltd., have removed to Imperial House, Kingsway, London, W.C.

The British Aluminium Company state that the rates for aluminium ingot and wire are £88 per ton and £112 per ton respectively.

New Cars for Doncaster.—The tramways manager, Mr. E. S. Rayner, has been instructed by the Tramways and Electricity Committee to prepare specifications for four new tram cars.

Illuminated Car as Recruiting Agent.—To encourage recruiting the Leeds tramways department ran their illuminated car, which bore the legend "To Berlin," over different routes on various days.

Nottingham Tramway Extensions.—A trial run over the new Lenton Sands section of the Nottingham tramways took place on Wednesday. The Board of Trade inspection will take place shortly.

A Glasgow Extension.—A new tramway route from Battlefield Road along Sinclair Drive, Glasgow, was inaugurated on September 6. Although the line is only a short one it will be of convenience to a large population in the neighbourhood.

Energy Costs at Aberdeen.—The Aberdeen Electricity Committee has recommended that for the next five years electrical energy be supplied to the tramways department at a cost of 0.85d. per unit for the first two million units, and 0.80d. per unit above this number.

Siemens' Employees.—More than 200 employees of Siemens Bros. and Co., Limited, have joined the colours. These men have been given leave of absence and their positions will be kept open for them. The firm is paying full wages to married men and half wages to single men.

Sunday Cars in Doncaster.—The experiment of running cars on Sunday in Doncaster appears to be proving successful. Since the war broke out an enormous number of people visit the town on Sundays, so that the running of the cars, though objected to by some of the citizens, has really become a necessity.

Salford Tramways Committee, owing to the circumstances caused by the war, have agreed to release until further notice the Bell Punch and Printing Company from the payment to the Corporation of £3 10s. per million tickets supplied to the Corporation in respect to the use of advertising spaces on the tickets.

Proposed Extension in Cardiff.—The Llandaff and Dinas Powis Rural District Council have further considered the question of extending the Cardiff Corporation tramway system into the area of the District Council. It was agreed to consent generally to the suggestion provided that the details were found to be satisfactory, and the work be carried out in twelve months.

The Minerva Battalion.—No less than 40 of Pinchin Johnson's employees have left their work to serve the country. Some are Reservists who have rejoined the colours, some have volunteered for foreign service with the Regular Army, whilst others have entered the Territorial ranks for home defence. The firm are keeping every position open for the men when they return, and whilst away all those who are married receive half-pay.

Fare Payment on the Platform.—The general manager of the Bradford Corporation tramways is of opinion that the payment of fares on the platform, which were adopted some time ago in Bradford, has had a very considerable effect in preventing accidents to passengers when alighting from or boarding cars while in motion. In nearly all cases these accidents are due to carelessness on someone's part, and the presence of the conductor on the platform is undoubtedly an advantage.

Relief Work at Leeds.—The construction of new tramways at Nippet Lane, Halton and Guiseley will shortly be commenced. This work will find employment for from 70 to 100 men for a period of three months at an average wage of 30s. per week. Powers have also been secured for the laying of several other lines. Paving in different districts is already providing work for over 400 men, and a further 100 can be set at work when required. The Road Board have recently made a grant of £20,000, which will be used

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for macadamising a number of the chief thoroughfares. A big service reservoir can also be put in hand and other work is being considered. The relief work is in the hands of a special committee, and Mr. J. B. Hamilton, commercial manager of the city, is acting as the executive to the committee.

New Equipments at Bradford.—In his annual report the general manager of the Bradford Corporation tramways mentions that the Tramways Committee have decided to scrap the trucks and equipments of about one hundred cars purchased between 1898 and 1900, and to replace them by new trucks and brakes of a departmental design. These brakes were described in our issue of May 7, 1914. The cars will be built by Hurst, Nelson and Company, Limited, of Motherwell, and will be equipped with 50 horse-power motors manufactured by Siemens Bros. and Co., Limited.

Catalogues for South Africa.—Catalogues or price lists of foreign firms addressed to importers, merchants, or manufacturers in the Union of South Africa will now be admitted free of duty. A previous duty has been charged of 25 per cent. *ad valorem* or 2d. per lb. whichever is higher, with a rebate to British goods of 3 per cent. This alteration in the law of the Union of South Africa was initiated by the British Electrical and Allied Manufacturers' Association, and was effected through the instrumentality of Sir R. Sothern Holland, H.M. Trade Commissioner, Cape Town.

A Good Example.—Last week £474 was collected through halfpenny contributions from the passengers on the Manchester tramway cars, and it is hoped that this sum will be exceeded this week If every passenger contributed a halfpenny it is estimated that £1,400 would be collected. To secure this result the tramway department are displaying advertisements on the cars and elsewhere and contribution boxes are carried on the car platform. The amounts contributed on the various routes last week are advertised with the object of encouraging competition among passengers on the routes.

Officer's Free Pass.—A curious debate took place at a meeting of the Pontypridd Tramways Committee on Tuesday last, when one of the members protested against the chairman granting a free pass to the officer in charge of the local National Reserve in order to assist him to patrol the district. Certain members argued that the matter should have been put before the committee, and pointed out that special rates had already been refused to Territorials. Other members supported the action of the chairman, Mr. William Phillips, on the ground that every facility should be afforded to those in charge of the forces, and ultimately the action of the chairman was confirmed.

Tramway Extensions at Leicester.—At a recent meeting of the Council a resolution was passed instructing the committee to bring forward any work that could be done at the present time. On September 7 Mr. Flint, chairman of the Tramways Committee, submitted proposals recommending tramway construction work involving an expenditure of £30,000, of which about £9,000 would be spent on labour. A good deal of the work would be suitable for men likely to be thrown out of employment. It was not intended to proceed with the extensions at once, as they would have to place a number of contracts which would take two or three months to arrange, and the work would probably not be begun until the end of the year. The proposals were approved.

A Singular Accident at Belfast.—A Belfast car which was proceeding up the Ormue Road on Tuesday was suddenly stopped. The conductor on going to the front of the car found that a dog had run under it and was fastened under the pilot board. The driver and conductor were not able to release the dog by moving the car either way. The driver got out his jack, slightly raised the wheel, and when the dog was taken from under the car it was found to be quite uninjured. Every Belfast car has always been provided with a jack and six wood blocks measuring 3in., by 3in., by 12in., which are sometimes needed to pack up the jack or truck in some accidents. The jacks carried by the cars are often very useful. With their help car crews have been known to put a traction engine off the track in less than ten minutes.

Thomson-Houston Employees and the War.—The members of the staff and works of the British Thomson-Houston Company, Limited, electrical engineers and manufacturers, Rugby, with branch works at Willesden and Coventry, are answering the call of their country in a whole-hearted manner. So keen is the patriotism of the employees that up to the present 852 have answered the call. This number represents over 30 per cent. of the eligible male adult employes, excluding those above enlisting age, boys under age, and females on the staff and in the works. It is the company's intention to pay half wages to those of its employees who have enlisted. The company further promises wherever possible to reinstate returning employees in their former position on the cessation of hostilities. In those positions where fresh help has to be employed to keep the works going, no male candidates will be considered who are not over 35 years of age or who cannot give proof by showing certificates that they are medically unfit to enlist. Reserve and Territorial officers on the staff of the company have rejoined their respective units in the Navy, Lancashire Fusiliers and the King's Horse, and it is noteworthy that one of the officers not being able to obtain his former commission has volunteered as a gunner in a howitzer battery. Lord Kitchener has sent a letter, through Major-General Rawlinson, to the managing director, expressing his appreciation of the company's attitude.

PERSONAL.

Mr. E. Jordan has been appointed assistant electrical engineer of Northampton Corporation.

Mr. Lloyd Davis has been appointed city engineer of Cape Town. Mr. Davis has been city engineer of Alexandria.

Mr. G. W. Lee, of Messrs. Stone and Webster, Boston, has been spending some weeks in this country investigating methods of tramway organisation and working.

Mr. Henry M. Sayers will deliver a course of twenty lectures on "The Economics of Electric Traction" at the London School of Economics, beginning on Wednesday, October 14.

Mr. Cecil Barber, who has represented the "Fram" interest of Mr. Conway Jenkin, has now been appointed sales manager of the General Vehicle Company, Limited, Imperial House, Kingsway, London, W.C.

Mr. H. E. Yerbury, at present resident tramways engineer of Sheffield, has been recommended by the Tramways and Electricity Committee for appointment to the position of deputy general manager and engineer of the electric supply department.

The Late Mr. T. B. Holliday.—The funeral of the late Mr. T. B. Holliday, manager and engineer of Hastings Tramway Company, took place on September 4 at Hastings cemetery, and it was attended by nearly 150 tramway employees, including representatives from Brighton, where Mr. Holliday was formerly engineer and manager. Among the mourners were Mrs. Holliday, Mr. and Mrs. Harry Holliday (son and daughter-in-law), Mr. G. Kitchen (chairman of the Tramways Company), Mr. W. Vincent Edwards (manager), and Mr. T. Ryan (traffic superintendent). Mr. Holliday left a widow and two sons, the elder of whom is engineer and manager of Rhondda Valley tramways. Mr. Holliday was not only a capable engineer of wide experience, but a man of exceptional fairness and generosity in dealing with employees. He was greatly respected by the staffs of the various undertakings with which he was connected and highly esteemed by his colleagues. A brief notice of Mr. Holliday's career is given in our issue of September 10.

CONTRACTS AND ORDERS.

Siemens Brothers Dynamo Works, Limited, have received an order from H.M. Office of Works for twelve months' supply of "Wotan" lamps.

Messrs. Charles Macintosh and Co., Ltd., have received an order from Bacup Electricity and Tramways Committee for distributing mains.

Edison and Swan United Electric Light Company have received an order from H.M. Office of Works for twelve months' supply of "Royal Ediswan" wire lamps, carbon and special lamps.

Launceston (Tasmania) City Council have placed an order with Messrs. H. Jones and Co., of Hobart, for the following tramway rails and accessories:—240 tons No. 1 B.S.S. 90-lb. rails, £7 12s. 6d. per ton; 30 tons No. 1 C.S. 96-lb. rails, £8 2s. 6d. per ton; 350 pairs fish-plates, 4s. 7½d. per pair; 1,832 fish-bolts, £1 8s. 2½d. per 100.

Sydney Municipal Council have accepted the following tenders:—Supply and erection of coal conveyor at power house, Babcock and Wilcox, Limited, £3,795 10s.; 33,000 volt outdoor transformers and switchgear, Australian General Electric Company, £4,287; four 2,000 k.v.a. 33,000/5,000 volt three-phase transformers for Homebusch abbatoir sub-station, Siemens Brothers Dynamo Works, Limited, £5,200; switchgear of 2,000 kw. capacity for refrigerating plant at abbatoirs, Australian General Electric Company, £2,548 10s.

FINANCIAL REPORTS AND MEETINGS.

The Manila Electric Railroad and Lighting Corporation.—A quarterly dividend at the rate of 1¾ per cent. has been declared on the ordinary stock.

Dumbarton Borough and Council Tramways.—The directors recommend a dividend of 1½ per cent. for the year on the ordinary shares, carrying forward £4,265.

Melbourne Tramway Company.—The London secretary of the Melbourne Tramway and Omnibus Company, Limited (Australia), has received cable advice of the declaration of a dividend of 6d. per share for the past quarter, and also a bonus of like amount, making together 1s. per share.

United Electric Car Company.—The annual meeting of this company will be held at the offices at Strand Road, Preston, on September 16, at 12 noon. The report for the year ended June 30, 1914, shows that after paying debenture interest, amounting to £641, and charging £6,184 for depreciation, including £4,500 added to the reserve, the profit for the year amounted to £16,095. Including £1,558 brought forward from last year, there is thus a total available of £17,654. Preference dividends for the year require £6,000, and the directors recommend that a dividend of 5 per cent. should be paid on the ordinary shares, and that £2,000 be placed to the general reserve, leaving £2,154 to be carried forward. The balance of the debenture stock was redeemed on January 1, 1914. Mr. George Richardson and Mr. John Kerr retired from the board during the year, and Mr. John Greenwood was elected a director.

Bradford Corporation Tramways.—The outstanding feature of the accounts for the year ended March 31 which the general manager, Mr. C. J. Spencer, has just submitted to the Tramways Committee, is the increase in expenditure as compared with the increase of revenue. Nevertheless the financial position as shown by the balance sheet is an exceedingly satisfactory one. The net increase

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of revenue is £17,353, while the net increase of expenditure is £29,749. The increase is mainly accounted for by the following items:—Wages, £8,333; new car equipments, £7,644; cost of energy, £4,327; rates and taxes, £4,402; sickness payments, £2,956. The increase in wages is partly due to higher wages (£4,333), while the increase in staff, due to increase in car mileage, has entailed an extra cost of £4,000. The percentage in the cost of labour to gross revenue has increased from 33 per cent. in 1909 to 37 per cent. In the meantime the average fare paid per passenger decreased from 1.165d. to 1.058d. The increase in the cost of new car equipments is only of a temporary character, and is due to the fact that quantities of new trucks, motors and cars have been obtained to replace rolling stock which has become under-powered and therefore obsolete. As regards the cost of electrical energy, its rise is attributed to the increase in car mileage and partly to increased consumption of energy per car mile due mainly to the running of heavier cars. A summary of the accounts is as follows:—

	£ s. d.		£ s. d.
Traffic revenue	298,524 15 11	+	17,767 4 4
Sundry revenue	18,881 14 6	+	288 6 7
Total revenue	£317,406 10 5	+	18,055 10 11
Working expenses	231,151 4 4	+	30,598 18 7
Gross profit	86,255 6 0	—	12,543 7 8

Against which is charged:—

Interest on capital	16,838 11 8	—	171 5 11
Income tax	3,888 0 8	+	235 11 4
Rent of leased lines	4,259 1 9	—	29 17 11
Sinking Fund	30,557 3 9	—	153 15 2
Repayment of mortgage loans	1,264 18 9	+	49 14 4
Opposition to Keighley Bill	414 11 9		
Balance of rates, 1912-13, etc.	378 13 11		
Reserve and renewals fund	11,454 3 9	—	£1,467 0 0
	£69,055 6 0		
Appropriated to City Fund in relief of rates	£17,200 0 0	+	8,200 0 0

The traffic revenue per car mile was 11.486d. for tramways, and 7.281d. for the railless lines. The total car mileage amounted to 6,206,239 and the units per car mile to 1.924. The Corporation now has 245 tramway cars, 3 railless cars and 13 petrol vehicles. The total number of employees is 1,356, an increase of 120 during the year.

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 60 of the principal undertakings of the United Kingdom for the week ended September 5 give total receipts of £239,634, or £3,835 more than in the corresponding week last year. The total length of track was 2,863 miles, or 24 more than for the corresponding week. Receipts were at the rate of £83 14s. per track mile, an increase of 12s. 11d. as compared with the corresponding week of last year.

THE BRITISH ELECTRICAL FEDERATION.

The traffic statement for the week ended September 4, 1914, shows that the receipts from tramways and railways amounted to £41,258, as compared with £41,125 in the corresponding week last year, and from omnibuses £17,217, as compared with £11,239, making a total of £58,475, as compared with £52,364. The tramway and railway route mileage was 430.54, as compared with 429.82. Upon such of the services as were working both last year and this year the receipts show a decrease of £705 upon the week.

METAL AND COAL MARKETS.

Owing to the war and the consequent dislocation of the markets no quotations for copper and aluminium or coal are available. The last quoted copper and aluminium prices were given in our issue of July 25, and coal prices in our issue of August 1.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1913.	1914.	Aggregate Wks.	1913-4.	Increase or Dec.
Anglo-Argentine	Aug. 26	£50,368	£49,000	34	£1,369,506	— £15,006
Auckland..... (28 days)	July 31	18,960	20,782	4½	23,311	+ 1,244
Ballarat and Bendigo	July 19	3,219	2,967	16	14,227	— 137
Brazilian St. Rly. Mtrs.	May	44,620	50,237	43	523,872	+ 76,626
Brazilian Traction.....	July 25	95,720	97,133	4	388,200	+ 8,334
Brisbane	August	29,970	33,172	5	231,887	+ 24,649
British Columbia .....$	July	755,943	690,023	4	690,023	+ 65,920
Buenos Aires Pt. & City	May	6,925	6,713	22	36,517	+ 3,306
Buenos Aires Lacrose...	July	45,231	43,337	4	43,337	— 1,894
Calcutta.....Rs.	Sept. 5	71,378	68,947	35	24,23,335	+ 1,27,651
Cape Town	June	11,560	12,742	52	155,466	+ 13,249
Carthagena & Herreras	August	2,192	2,758	35	18,970	— 4,347
Cordoba.....	July	13,629	14,256	17	56,238	+ 2,542
East India	August	2,005	2,112	53	23,302	+ 916
Kalgoorlie.....	June	2,854	2,692	26	15,523	— 1,704
La Plata.....	July	4,770	4,359	30	38,608	— 2,739
Lima.....	July	34,426	34,600	31	241,931	+ 9,365
Lisbon ..... Mtrs.	July	164,715	171,179	31	1,143,064	+ 45,838
Madras (14 days) Rs.	Aug. 31	28,084	29,589	33	465,638	+ 35,433
Manila.....	June	133,500	132,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	387,500	+ 7,000
Mexico .....$	July	610,602	628,206	31	4,158,751	+ 283,609
Montevideo.....	August	28,829	26,075	43	309,788	— 6,698
Para	August	24,485	19,354	39	189,946	— 88,540
Port Elizabeth.....	June	3,268	3,212	53	44,931	+ 1,901
Puebla .. ..$	July	56,700	51,000	31	431,200	+ 20,100
Rangoon	June	4,807	4,997	26	33,384	+ 982
Shanghai .....$	July 29	31,163	24,600	30	720,340	+ 94,215
Singapore .....$	Aug. 1	12,044	10,800	30	367,705	+ 4,378
Toronto .....$	July	311,966	366,291	31	5,892,147	+ 424,696
Winnipeg.....$	July	336,821	346,630	31	2,486,123	+ 123,997

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	1914.	Incr. or Dec.	Aggregate. Wks.	1913-4.	Increase or Dec.
Aberdeen Corporation..	Sept. 2	£1,896	£1,723	— £173	13	£35,215	+ £957
Accrington Corp.....	,, 2	615	485	— 130	23	13,186	+ 205
Ayr Corporation	,, 5	382	349	— 33	16	8,116	— 113
Bath Electric	,, 2	1,379	1,104	— 275	35	34,982	+ 997
Birkenhead Corp.	,, 6	1,282	1,339	+ 57	22½	29,464	— 528
Birmingham Corp.	,, 5	11,703	11,372	— 331	23	280,939	+ 18,996
Blackburn Corporation	,, 2	1,476	1,221	— 255	23	32,186	+ 1,535
Blackpool Corporation	,, 8	4,296	2,627	— 1,669	23	50,582	— 3,990
Bolton Corporation	,, 6	3,211	2,982	— 229	23	65,599	+ 2,011
Bournemouth Corp.....	,, 9	2,817	2,123	— 694	23	53,448	— 1,459
Bradford Corporation...	,, 5	5,898	5,870	— 28	23	147,369	+ 9,155
Brighton Corporation..	,, 7	1,377	1,378	+ 1	23	28,418	+ 363
Bristol	,, 4	9,201	9,377	+ 176	35½	307,532	+ 20,269
British Elec. Federatn.	,, 4	53,364	58,475	*	...	...	...
Burnley Corporation ..	,, 5	1,668	1,396	— 272	23	33,080	— 1,452
Burton-on-Trent Corp.	,, 6	296	301	+ 5	23	7,084	+ 310
Bury Corporation.....	,, 6	1,445	1,877	+ 432	23	33,450	+ 1,778
Cardiff Corporation....	Aug. 15	2,828	2,740	— 88	19	57,610	+ 2,491
Chatham and District..	Sept. 3	992	1,138	+ 146	35	33,084	+ 565
Chesterfield Corp.	,, 3	253	259	+ 6	21	6,373	+ 478
Colne Corporation	,, 5	308	233	— 75	...	...	...
Cork Electric.....	,, 3	558	544	— 14	35	17,290	+ 126
Croydon Corporation ..	Aug. 23	1,663	1,688	+ 25	21	39,057	+ 2,402
Darlington Corporation	,, 12	240	262	+ 22	21	5,908	+ 359
Derby Corporation	Sept. 5	1,083	1,012	— 71	22½	24,069	+ 1,076
Dover Corporation	,, 5	299	286	— 13	23	6,077	— 128
Dublin & Lucan	,, 4	157	157	Nil	9½	1,628	— 163
Dublin United	,, 4	2,917	6,056	+ 3,138	35	209,104	— 1,374
Dundee City	,, 2	1,434	1,285	— 139	15½	21,168	+ 118
East Ham Corporation	,, 5	968	1,255	+ 287	23½	25,552	+ 2,833
Exeter Corporation	,, 4	379	397	+ 18	23	8,559	+ 311
Gearless Motor 'Buses.	,, 5	537	573	+ 36	36	16,979	+ 6,771
Glasgow Corporation ..	,, 5	20,458	20,342	— 116	13	282,458	+ 10,133
Glossop (U. Elec. Supply)	,, 5	134	112	— 22	36	4,548	— 102
Halifax Corporation ...	,, 1	2,228	2,212	— 16	23	53,036	+ 3,231
Hastings & District.....	,, 2	1,557	1,307	— 250	35	37,070	— 1,453
Huddersfield Corp.	,, 5	2,094	2,234	+ 140	23	74,553	+ 5,701
Hull Corporation	,, 5	3,053	2,931	— 122	23	71,816	+ 1,791
Ilford U.D.C.	,, 5	439	618	+ 179	22	13,920	+ 2,449
Ilkeston Corporation ...	,, 9	142	130	— 12	23	3,140	— 42
Ipswich Corporation ...	,, 5	526	496	— 30	23	11,458	+ 312
Isle of Thanet	,, 5	1,593	1,191	— 402	48	30,556	— 2,409
Kilmarnock Corp.	,, 5	169	155	— 14	16	2,842	— 174
Lanarkshire	,, 3	1,839	1,919	+ 80	35	66,858	+ 8,057
Lancashire United	,, 2	1,879	1,680	— 199	35	58,368	+ 4,894
Leeds City	,, 5	8,196	7,683	— 513	23	194,558	+ 4,997
Leicester Corporation..	,, 5	2,835	2,706	— 129	36	103,502	+ 4,139
Leith Corporation	,, 5	729	701	— 28	16	13,582	+ 490
Leyton U.D.C.	,, 3	1,305	1,443	+ 138	21	30,933	+ 1,689
Liverpool Corporation..	,, 5	13,170	13,236	+ 66	35½	471,269	+ 13,236
Llandudno & Colwyn B.	,, 4	806	493	— 313	40	13,798	— 1,567
London County Council	,, 2	40,841	43,068	+ 2,727	23	978,291	+ 49,379
London Gnl. Omnibus..	Aug. 1	68,575	71,625	+ 3,050	31	1,982,031	+ 64,894
London United	Sept. 4	6,091	6,557	+ 466	36	234,990	— 912
Lowestoft Corporation	,, 5	403	282	— 121	48	10,600	+ 190
Maidstone Corporation	,, 3	210	219	+ 9	23	5,117	+ 306
Manchester Corp.....	,, 5	17,968	17,035	— 933	23	405,192	+ 4,208
Met. Elec. Trys.	,, 4	8,965	9,192	+ 207	36	327,708	+ 5,690
Nat. Steam Car Co., Ltd.	,, 7	3,358	4,819	+ 1,461	44	191,303	+ 72,651
Nelson Corporation.....	,, 5	214	152	— 62	22½	4,800	— 171
N'castle-on-Tyne Corp.	,, 5	4,768	5,716	+ 948	23	123,090	+ 11,943
Newport (Mon.) Corp....	,, 5	820	871	+ 51	23	19,681	+ 2,022
New St. Helens & Dist...	,, 2	935	1,093	+ 158	9	9,198	+ 250
Northampton Corp	,, 4	626	638	+ 12	23	13,549	+ 116
Nottingham Corp.	,, 3	3,354	3,244	— 110	22½	78,537	+ 3,313
Oldham Corporation ...	,, 6	1,982	2,851	+ 869	24	55,828	+ 2,795
Portsmouth Corp.....	Aug 29	2,968	2,648	+ 320	23	56,816	...
Preston Corporation ..	Sept. 2	954	937	— 17	23	21,317	+ 676
Provincial	,, 5	2,392	2,344	— 48	48	95,044	+ 2,047
Reading Corporation ...	,, 2	740	751	+ 11	22	16,614	+ 835
Rhondda.....	,, 3	1,275	1,308	+ 33	35	43,855	+ 2,019
Rochdale Corporation	,, 5	1,761	2,036	+ 275	23	39,227	+ 1,602
Rotherham Corp.....	,, 9	1,027	1,095	+ 68	23	23,985	+ 970
Salford Corporation ...	,, 7	5,604	5,357	— 247	23	119,512	— 1,512
Sheffield Corporation...	,, 6	7,414	7,468	+ 54	23½	184,339	+ 7,504
Southampton Corp.....	,, 2	1,499	1,423	— 66	22	31,852	+ 1,234
Southend-on-Sea Corp.	Aug. 26	1,673	1,467	— 206	22	25,868	+ 2,821
South Met. Trys.	Sept. 4	1,045	1,193	+ 148	36	39,810	+ 8,254
South Shields Corp.....	,, 5	728	756	+ 28	22½	18,573	+ 1,658
Sunderland Corp.....	,, 6	1,568	1,557	— 11	23	35,910	+ 1,522
Sunderland District ...	,, 2	569	491	— 78	44	25,979	+ 1,655
Swindon Corporation ...	,, 2	178	193	+ 15	22	4,108	+ 387
Torquay	,, 3	1,121	690	— 431	35	20,978	+ 2,212
Trys. (M.E.T.) 'Buses	,, 5	7,895	9,291	+ 1,396	36	322,940	+ 188,537
TynesideTrys. & Tards	,, 2	534	765	+ 231	10	5,834	+ 463
Wallasey Corporation	,, 5	1,335	1,355	+ 20	23	31,371	+ 1,648
Walsall Corporation ...	,, 5	607	606	— 1	36	22,488	+ 277
Walthamstow U.D.C....	,, 5	707	890	+ 183	22	19,748	+ 2,260
Warrington Corp.....	,, 3	432	426	— 6	22	9,902	— 130
West Ham Corporation	,, 3	2,688	2,850	+ 212	22	64,782	+ 3,199
Wigan Corporation	,, 3	1,495	1,401	— 94	23	33,485	+ 204
Wolverhampton Corp ...	,, 9	1,048	1,005	— 43	24	25,496	— 94
Yorkshire (W. Riding)	,, 6	1,417	1,463	+ 46	36	52,806	+ 708

* From such of the services as were working both last year and this year the receipts show a decrease of £705 upon the week.

DICK, KERR & CO.,
Limited,
ABCHURCH YARD, CANNON STREET,
LONDON, E.C.
ENGINEERS & CONTRACTORS.
Complete Equipment
TRAMWAYS & LIGHT RAILWAYS
at home and abroad.

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THE

Tramway & Railway World

Vol. XXXVI. No. 15.] LONDON, SATURDAY, SEPTEMBER 19, 1914. [Established in 1892.

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Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2945 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

COUNTY OF LONDON.

The London County Council invites tenders for the Road Work and Platelaying required for the Construction on the Overhead System of Traction of the authorised Tramways from Lee Green to Eltham. The length of track is about 3.54 miles of single line. The contractor will be required to use the rails with their fastenings, and the special work for the various crossovers, etc., which will be provided by the Council under other contracts, but all the remaining metal work and other materials will be included in the contract.

Certain paving works for widening the road will also be included in the contract.

The specifications, bills of quantities, forms of tender, drawings, etc., may be obtained on and after Tuesday, September 22, 1914, from the Council's Chief Engineer, Mr. G. W. Humphreys, at the County Hall, Spring Gardens, S.W., after payment to the Cashier of the Council of £5. This amount will be returnable only if the tenderer shall have sent in a *bona-fide* tender, and shall not have withdrawn the same. The contract documents may be inspected before the payment of the fee.

The person whose tender is accepted will be bound by the contract to pay wages at rates not less, and to observe hours of labour not greater, than the rates and hours set out in the Council's list. Particulars of the Council's Standing Orders as to its conditions of tender and contract are given in every issue of the *London County Council Gazette*. No tender received after 11 a.m. on Tuesday, October 13, 1914, will be considered. The Council does not bind itself to accept any tender.

LAURENCE GOMME,
Clerk of the London County Council.

County Hall, Spring Gardens, S.W.,
September 17, 1914.

GREAT INDIAN PENINSULA RAILWAY COMPANY.

The Directors are prepared to receive tenders for the supply of the following Stores, namely :—

Lamps and Fittings.	Cast Iron Chairs.
Steel Fish-plates.	Crank Axles.
Steel Fish-bolts, etc.	Steel Tyres.

Specifications and forms of tender may be obtained at this office on payment of the fee for the specification, which payment will not be returned.

Tenders must be delivered in separate envelopes, sealed and addressed to the undersigned, marked "Tender for Lamps and Fittings," or as the case may be, not later than 11 o'clock a.m. on Thursday, September 24, 1914.

The Directors do not bind themselves to accept the lowest or any tender.

R. H. WALPOLE,
Secretary.

Company's Offices,
48, Copthall-avenue, London, E.C.,
September 14, 1914.

BENGAL AND NORTH-WESTERN RAILWAY COMPANY, LTD.

The Directors are prepared to receive tenders for the supply and delivery of :—

500 Tons of Steel Flat-Footed Rails (N.S.), 50 lb. per yard, and 2,410 Pairs Steel Fish-plates,

as per specification to be seen at the Company's offices.

Tenders, addressed to the undersigned, and marked "Tender for Rails, etc.," or as the case may be, are to be lodged not later than noon on Tuesday, the 29th day of September, 1914.

For each specification a fee of 10s. will be charged, which cannot, under any circumstances, be returned.

The Directors do not bind themselves to accept the lowest or any tender.

By order of the Board,
ALEXANDER IZAT,
Managing Director.

237, Gresham House,
Old Broad Street, London, E.C.,
September 17, 1914.

BOROUGH OF HORNSEY.

The Town Council invite tenders for the

Supply, delivery, and complete erection of two Rotary or Motor Converter Sets, etc.

Forms of tender, etc., may be obtained, after 10s. 6d. has been deposited with the Borough Treasurer (to be refunded to *bona-fide* tenderers after tenders have been considered), of the Borough Electrical Engineer, at the Electricity Works, Tottenham Lane, Hornsey.

Tenders, endorsed "Tender for Rotary or Motor Converter Sets, etc.," to be delivered, or sent by post, to me at the offices below by 4 p.m. on Friday, October 9, 1914.

The Council reserve to themselves the right to decline all, or any, or any portion of any, of the tenders sent in.

F. D. ASKEY,
Town Clerk.

Town Hall, Southwood Lane, Highgate, N.,
September 15, 1914.

MANCHESTER CORPORATION TRAMWAYS.

The Tramways Committee of the Manchester Corporation are prepared to receive tenders for the supply of a Car Wheel Tyre Boring Mill. Specifications and forms of tender may be obtained on application to Mr. J. M. McElroy, General Manager, Corporation Tramways, 55, Piccadilly, Manchester. Tenders are to be addressed to the Chairman of the Tramways Committee, 55, Piccadilly, Manchester, endorsed "Tender for Tyre Boring Mill," and must be received not later than 10 a.m. on Tuesday, October 6, 1914.

The Committee do not bind themselves to accept the lowest or any tender.

THOMAS HUDSON,
Town Clerk.

Town Hall, Manchester,
September 11, 1914.

COUNTY BOROUGH OF WARRINGTON.

ELECTRICITY DEPARTMENT.

The Electricity and Tramways Committee of the County Borough of Warrington invites tenders for the

Supply of High Tension Cable.

Specification and form of tender can be obtained from the undersigned on payment of one guinea, which will be returned on receipt of a *bona-fide* tender. Five shillings will be charged for extra copies of specification.

Tenders, addressed to the Chairman of the Electricity and Tramways Committee, Town Hall, Warrington, must be sealed with wax, and endorsed "Tender for Cable," and delivered not later than 12 o'clock noon on Tuesday, September 29, 1914.

The lowest or any tender will not necessarily be accepted.

F. V. L. MATHIAS,
Borough Electrical and Tramways Engineer.

Howley, Warrington.

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POSITIONS VACANT.

COUNTY BOROUGH OF NEWPORT.

ELECTRICITY AND TRAMWAYS DEPARTMENT.

Applications are invited from fully qualified men to fill the following Vacancies :—

Senior Engineer-in-Charge, £104 per annum.
Junior Engineer-in-Charge, 30s. per week.
Switchboard Attendant, 25s. per week.
Mains Foreman, £2 10s. per week.

Applications, in candidates' own handwriting, together with brief particulars of training, experience, and copies of not more than three recent testimonials, to be addressed and forwarded to the undersigned at once.

The appointments in the cases of the senior engineer-in-charge and the mains foreman will be permanent appointments.

A. NICHOLS MOORE, M.I.E.E.,
Borough Electrical Engineer.

Town Hall, Newport, Mon.,
September 15, 1914.

FOR SALE.

SHIPLEY URBAN DISTRICT COUNCIL.

RAILS, FISH-PLATES, ETC.

The Shipley Urban District Council invite offers for about 160 tons old Steel Tram Rails, Fish-plates, Tie-Bars, etc., on their Bradford Road Tramway Track, recently re-laid. Tenders, stating the price per ton for the material where at present laid, to be sent in not later than Tuesday, September 29, 1914, endorsed "Old Tram Rails."

I. LINDOW,
Clerk to the Council.

Council Offices, Shipley, Yorks,
September 17, 1914.

TRAMWAY SUPPLIES, Ltd.,
Tramway Engineers,
Sole Selling Agents for S. Dixon & Sons' Tramway Material,
160, WOODHOUSE LANE, LEEDS.
Sole Manufacturers of
TURNER'S PATENT AUTOMATIC POINT CONTROLLERS.
Telegrams: "Controllers, Leeds." Telephone: 3488 Leeds.
OVERHEAD LINE MATERIAL AND SUPPLIES.

SEND YOUR ENQUIRIES FOR
Insulating Materials,
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TO
JOSEPH THOMPSON,
COLUMBIA WORKS, 106, Eyre Street, SHEFFIELD.
Telegrams: "Insulator. Sheffield."
Engineers' Specifications worked to.

SIMPLEX CONDUITS, Ltd.
GARRISON LANE, BIRMINGHAM.
Makers of Simplex Steel Conduit System and
WIRES and CABLES.
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TRAMCAR HEATERS.
TRAMCAR METERS.
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WATERTIGHT FITTINGS FOR CAR SHEDS.
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RIPON, England

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PINNERS' HALL, GREAT WINCHESTER STREET, LONDON, E.C.
SUPPLY
JARRAH
THE SANITARY WOOD PAVING
REGISTERED TRADE MARK. M.J.
Telegrams: "JARRAH, LONDON." Telephone: 368. LONDON WALL.

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Car Varnish
for finishes of great durability and brilliant lasting lustre.
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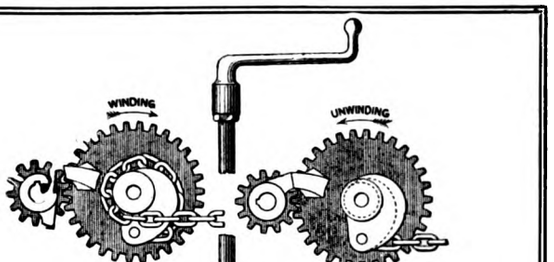
E.C



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THE
Tramway and Railway World

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SATURDAY, SEPTEMBER 19, 1914.

THE "OCEAN"
ACCIDENT AND GUARANTEE CORPORATION, LTD.,
IS THE
PREMIER INSURER OF TRAMWAYS
HEAD OFFICE:
MOORGATE STREET, LONDON, E.C.

COMBINED POWER STATIONS.

In the early days of electric traction in this country, when it became certain that the local authorities of nearly all the larger towns would take up the operation of tramways, the question arose whether it was preferable to have a separate independent electric generating station for the tramways or to have a combined station, partly for tramways and partly for municipal electric lighting. In most towns the latter policy was adopted, but at the same time a number of the most important and energetic municipalities in the country provided separate power stations for the tramways. In these pages we advocated the separate power station, on the grounds, among others, that it was desirable to know exactly what electric traction would cost, that combined stations would lead to the tramways being saddled with part of the burden of a financially dubious electric-light undertaking, and that the tramways should have their separate station in order to obtain the full advantage of their superior load factor. In those days the municipal electric supply undertaking often meant merely a little electric-lighting concern with a demand spread over only a few hours out of the twenty-four, with high costs per unit and a correspondingly high price to the purchaser, even though the latter was a tramway system. Things have changed considerably since then, and within more recent years a tendency has arisen in cases where there are separate power stations to interconnect the supplies, and thus to some extent produce the features of a combined station. Among places where this has been done is Glasgow, but care has been taken to keep the power production for the tramways distinct, so that the tramway working expenses account remains complete and independent. Sheffield has now gone a step further, and the Kelham Island tramway power station—interconnected since last year with the Neepsend electric supply station—is now being taken over by the Electricity Supply Committee, and current is to be purchased by the tramway department at the price of .8 of a penny per unit. In support of this change various reasons can be adduced, some general and others local. Among general reasons is the fact that municipal electric supply is now, in many instances, a much bigger thing than merely an electric-lighting business. In addition to the development of lighting, there has been the great growth of supply for general power purposes in factories, etc., giving a valuable day load and decreasing the works cost per unit. Hence it cannot be said with the same truth as before that the tramway is used to bolster up a feeble concern. At the same time the fact remains that the addition of a tramway load to any electric supply station is of enormous value, owing to the long period of the day and night over which the load is spread. The diversified load on the station is a very great advantage to it, and, besides, large turbine units, with their high economy, can be employed. As to reasons local to Sheffield, it is pointed out that the tramways have developed on larger lines than was expected when the Kelham site was chosen. The position of that site is such that the working of the station is handicapped, and it is not convenient to enlarge it. The Neepsend station has been developed on larger lines, and it can supply the tramways now, and will be able to do so as they develop in the future. It also appears that a joint sub-committee of the Tramways and Electric Supply Committees are satisfied that the change may effect appreciable economies. As to the price of .8 of a penny per unit, it is a little higher than the works costs at Kelham have been, but it includes a small margin for profit and renewals, and presumably the Tramways Committee will be freed from any liability for interest and sinking fund on the Kelham station, which liability is not included in what are called works costs. On the whole, the new arrangement in Sheffield appears a desirable one, but in regard to other cases each, of course, would have to be considered on its own merits.

TRADING WITH THE ENEMY BILL.

This Bill, to which reference was made in our issue of last Saturday, was read a third time in the House of Commons on Monday evening. Prior to that the Attorney-General (Sir J. Simon) said that the Bill gave power to the Board of Trade to inspect accounts of companies which had a predominantly hostile composition as regards directorate or capital. It appeared that the powers of the Board of Trade ought to be enlarged so as to cover the case of an individual person, and an amendment for this purpose was agreed. Another amendment was adopted on the motion of the Attorney-General to enable the Board of Trade to apply to the High Court for the appointment of a controller of any business enterprise in which an offence under the Act had been or was likely to be committed in connection with its trade, or where the control or management of any business had been or was likely to be so conducted in a state of war as to prejudice that trade or business. He said there were certain trades in the country the direction of which in times of peace was in charge of persons who had now left to take part on the side of the enemy. For national purposes these industries must be preserved, and by means of a controller these industries could be kept going. They preferred to use the word controller instead of receiver.

Barton and Winteringham Light Railway.—At a special meeting of Lindsey County Council on September 11 a recommendation by the General Purposes Committee was adopted to the effect that the Council should apply to the Treasury for an advance of £60,000 from the development fund, to be lent either to the Great Central Railway Company or to the North Lindsey Light Railway Company, or to both, at 3 per cent. interest, and on a currency of 31 years, in return for the construction and working of the light railway between Barton and Winteringham. The advance is to be made to the Council on the terms that all moneys received by the Council from the railway companies are paid over to the fund as and when received. One of the conditions of the scheme is that the County Council shall not incur any liability upon the county rate.

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MISCELLANEOUS NEWS AND NOTES.

Coventry Tramway's Motor Omnibuses have been requisitioned by the Government for military purposes.

Adelaide Municipal Tramway Trust has decided to order 10 motor omnibuses to supplement the tramway services.—*British Australasian.*

Keighley.—An inquiry by the Local Government Board has recently been held into the application of the Corporation to borrow £10,700 for the electricity undertaking.

Croydon Extensions.—An estimate of £2,550 for constructing a short double line of tramway track in Selhurst Road, Croydon, has been approved by the Town Council.

South Lancashire Extension.—A proposal has been made locally that the South Lancashire Tramways Company should extend their lines to Astley, where large coal fields are now being opened up

Liverpool Tramways Committee have decided to allow recruits not in uniform to travel free on the Corporation cars. Passes are to be obtained by special application at the Liverpool Territorial Headquarters.

Light Railway Commission.—The Board of Trade have issued an additional rule with respect to applications to the Light Railway Commissioners. Copies of the rule can be obtained through any newsagents.

Keighley Railless Omnibuses.—The Town Council propose to purchase two more trolley vehicles from the Cedes Electric Traction, Ltd., at a total cost of £1,613. A shed for railless omnibuses is to be constructed at Utley.

Motor Omnibuses at Oldham.—Motor omnibuses will be tried on the route to Denshaw. During the recent holiday week the tramways department ran motor omnibuses on this line, and the receipts amounted to about 2s. 2d. per vehicle mile.

Cottages for Tramway Men.—York City Council on September 14 adopted a proposal to erect 28 cottages for tramway workmen. The estimated cost is £6,851, and the annual charges are estimated at £455, which will necessitate a rental of 6s. 3d. per week per cottage.

New Cars at Chatham.—Chatham and District Light Railway Company have recently obtained three new cars equipped with British Thomson-Houston motors and controllers. The car bodies and trucks were supplied by the United Electric Car Company, of Preston.

Heywood Electricity Supply.—At the last meeting of Heywood Town Council plans and detailed estimates were submitted for the proposed bulk supply scheme including extensions to buildings. These were approved, and the borough surveyor was instructed to obtain tenders for the buildings.

Portsmouth and Omnibuses.—At a meeting of Portsmouth Town Council it was agreed that the Town Clerk should instruct the Parliamentary Agents to draft clauses for obtaining powers to run motor vehicles in the borough, and also to enable the Council to carry tramway profits to the general district rate as well as to the borough fund.

Torquay Extensions.—The Local Government Board have recently sanctioned the borrowing of £5,000 for extensions of electric supply mains. An inquiry has been held regarding an application to borrow £16,000 for the extension of the generating plant, which will include £4,000 for two water-tube boilers, fuel economiser, feed pump and mechanical draught apparatus.

York Tramway Extensions.—Tenders for the construction of the proposed light railway on the Hull Road route are to be obtained as soon as the necessary plans and specifications have been prepared. The Tramways Committee have instructed the manager, Mr. Hame, to report on the equipment of the railless trolley routes authorised by the Corporation Act of this year, and to obtain quotations for the supply of motor omnibuses, including two electric omnibuses.

Commercial Cars, Limited, of Luton (several hundreds of whose Commer cars are being used by the War Department for carrying supplies at the seat of war), has sent one hundred guineas to the Prince of Wales's Fund. The board has decided to pay to the wives or other persons dependent upon the earnings of the men who have joined the colours a weekly amount equal to their weekly earnings less the amount the men receive as pay from the Government.

London Made Polack Tires.—The new works at Isleworth, where Polack tires will now be manufactured, is a good example of an up-to-date rubber factory. The buildings have been specially designed for the economical manufacture of mechanical rubber goods, as well as solid tires, and are fitted with the latest types of rolling mills and machinery, all of which are of British manufacture. A well-trained staff will ensure that the high standard of quality hitherto associated with the name "Polack" will be maintained.

More Urgent Business.—The calling up of practicaly the whole of the French Reserves has rendered it impossible for many of our French contemporaries to continue publication. Among those newspapers which have temporarily ceased to be issued are *L'Industrie des Tramways et Chemins de Fer*, the organ of the Tramways and Light Railways Association of France, *La Lumière*, and *L'Electricien*. Several Italian technical publications have also suspended publication until the postal service becomes more regular. Among them is *L'Elettrotecnica*, of Milan, the official organ of the Italian Electrical Association.

The London School of Economics, Clare Market, Kingsway, have issued a list of lectures and classes on railways and cognate subjects to be delivered during the coming session. The work of this school is now well known, and the attendance is increasing. The inaugural lecture, which is open to the public without fee, will be delivered on Monday, October 12, at 6.15 p.m. by Mr. Stephenson, when Sir Charles Owens will take the chair. There will be a course of lectures on railway organisation, railway rates and fares, geography of the chief railways of Canada and the neighbouring lines in the United States, and the parliamentary history of English railways. Advance lectures on economics and other topics will also be given, including a course of twenty lectures by Mr. Henry M. Sayers on "The Economics of Electric Traction." The latter lectures will be delivered on Wednesdays at 6.15 p.m. during the Michaelmas and Lent terms, beginning on October 14.

The Success of Sheffield Tramways.—At a meeting of Sheffield City Council Sir William Clegg, in moving the adoption of the tramway report and accounts, a summary of which has already been published, said that during the year the department had made greater progress and was of more public utility than at any time since electric traction was inaugurated in the city. The large increase in the mileage caused by running excess cars in order to avoid overcrowding at busy times of the day had resulted in a decrease of ¼d. per car mile in the traffic receipts. The fares were such that on an average over 2¾ miles could be travelled for 1d. If this distance went on increasing by the extension of the tramway termini, and the average fare, on the other hand, continued to decrease, the result would be that the actual profit available for the rates could not in future show a very appreciable increase. The Council and the public must rest content with a decreased amount of profit if they were to give increased facilities, a principle with which he entirely agreed, subject to certain limitations.

Manchester and Salford Corporation Tramways have been badly hit, says the *Manchester Courier*, in more ways than one by the war. A big proportion of their employees have joined the colours, and fewer people are using the services. The men have been given every encouragement to join the army, and they will not suffer financially if they do so, while their old positions will be given to them on their return. The vacancies, said Mr. J. M. McElroy, the general manager of Manchester Tramways, recently, are gradually being filled up by temporary engagements. The parcels department in Manchester is suffering severely, the decrease in revenue being as much as 25 per cent. Mr. G. W. Holford, general manager of Salford Tramways, said that their difficulties were being met by re-arrangements of the staff and by stopping holidays. To some extent, both in Manchester and Salford, matters are automatically being readjusted by the decrease in the traffic necessitating fewer cars. The figures do not, however, show the decrease that might have been expected, and they are comparatively unimportant.

THE BRITISH THOMSON-HOUSTON COMPANY.

To the Editor of The Tramway and Railway World.

Dear Sir,—I notice in some of the electrical papers various letters which enquire into the composition of the British Thomson-Houston Company, Limited. Although the files at Somerset House tell the whole story, few take the trouble to make an examination, and, therefore, the following may be of interest, and I would appreciate it if you will publish the information in full:—

Our capital consists of 80,000 shares of the par value of £10 each and £186,215 of debentures.

Our shares are held as follows:—

44	English shareholders	holding	10.458 shares
11	French ,, ...	,,	3,109 ,,
9	American ,, ...	,,	64 876 ,,
1	Belgian shareholder	,,	83 ,,
1	German ,, resident in Cologne	,,	333 ,,
1	,, ,, ,, England	,,	1,141 ,,
	Total ...		80.000 ,,

Neither of these last two shareholders, so far as we know, are in any way connected with electrical manufacturing companies, either here or in Germany.

We have 106 debenture holders, all of them resident in England, and all English, with the exception of one French lady, who holds £2,000 par value, and she resides in Folkestone. We have not a single German in our employ, or in any way connected with the company.

Our active board consists of the following:—

J. F. Nauheim, who represents the shares held by Lord Rothschild in our Company. He has resided here most of his life, and has been naturalised between 30 and 40 years;

George Franklin, of Sheffield and London, who was at one time Lord Mayor of Sheffield, and who was Chairman of the National Telephone Company;

Owen H. Smith, who came on originally to represent our Debenture holders. He is one of "The Proprietors of Hay's Wharf, Ltd.";

F. Fraser, a Scotsman, who is also our Secretary;

W. C. Lusk, Manager of our Commercial Departments;

H. N. Sporborg, our Chief Engineer; and

Myself, the Managing Director.

We (the latter three) are American born, and have been here from 10 to 12 years.

The other members of our board are three Americans residing in New York, who represent large shareholders, and one of them for many years resided in London—namely, C. A. Coffin, E. W. Rice, Junr., E. A. Carolan.

The two former are chairman and president respectively of the General Electric Company of New York, the patents of this company and its predecessor, the Thomson-Houston Company, forming the original basis of our company.

C. Burrell, an Englishman, who has spent most of his life in France, now living in Paris.

E. Thurnauer, who is an American citizen, also living in France.

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These two are managers of the Compagnie Francaise pour l'Exploit des procédés Thomson-Houston, and represent on our board the French shareholders.

The total number of our employees is about 5,600, a large number of whom are, of course, young women in the lamp factory. Our factories are at Rugby, Coventry and Willesden.

So far about 900 of our employees have joined the Colours, which is over 50 per cent. of those who are eligible, and all who have joined, both married and single, receive half wages, or salaries, while they are away, and their places will be kept open for them until their return, to the fullest possible extent. I might also add that no changes have been made in the salaries of those who remain in the company's employ.

Faithfully yours,
H. C. LEVIS,
Managing Director.

The British Thomson-Houston Company, Ltd.,
83, Cannon Street, London, E.C.
September 14, 1914.

CONTRACTS AND ORDERS.

Messrs. Davis, Lowe and Sons, Limited, have an order from Manchester Tramways Committee for cast iron pipes for heating purposes.

York Electricity and Tramways Committee recommend acceptance of the tender by G. Robson and Company, Sheffield, for the supply of a rail grinder at £65.

Willans and Robinson, Limited, have an order from the Wolverhampton Town Council for reconstructing the 2,000 kw. turbo-alternator at the tramway generating station.

Prahran and Malvern Tramways Trust have accepted the tender of the Meadowbank Manufacturing Company for twenty car bodies of the combination type, the price to be £527 each.

The Daimler Company, Limited, Coventry, have received an order from Manchester Tramways Committee for six motor omnibus chassis to replace those which have been commandeered for army service.

Walsall Tramways Committee has accepted the tender of the Daimler Company, Limited, for four double deck and two single deck motor omnibuses, at a total cost of £4,595. Six sets of tyres are to be purchased direct from the Dunlop Company at £321 7s.

The British Westinghouse Company are recommended by York Electricity and Tramways Committee for the supply of transformers required in connection with providing electric current in outlying districts. The tender of the company amounted to £542 10s.

Sunderland Corporation has placed an order for two 1,500 kw. converters with the General Electric Company, Limited, of Witton. Tenders were also received from the following firms: Bruce Peebles and Company, British Westinghouse Company, British Thomson-Houston Company, Dick, Kerr and Company, Electric Construction Company, Mather and Platt, Siemens Brothers Dynamo Works, and Vickers, Limited.

Ilford District Council has accepted the tender of the agents for the North Eastern Steel Company, Messrs. A. McBean and Son, at £8 2s. 6d. per ton for rails and £9 7s. 6d. for fish-plates. The tender of Messrs. Walter Scott and Company was £8 10s. for rails and £10 5s. for fish-plates. Mr. Sandberg, since the acceptance of the tender, has under the special circumstances reduced his usual fee on the rails to one half.

Sydney Municipal Council has placed an order for a 5,000 kw. turbo-alternator and condensing plant with Messrs. Willans and Robinson, Limited, in substitution for an order previously placed with a German firm. The machine will consist of a standard Willans "disc and drum" turbine, coupled to a Dick-Kerr alternator, the turbine exhausting into a Willans surface condensing plant with rotary air pumps. The Municipality have given Messrs. Willans and Robinson terms of payment embodying monthly instalments, as the work proceeds, up to a total of 80 per cent. of the value of the contract on shipment. Messrs. Preece, Cardew and Snell are acting as engineers in this country for the Corporation.

Anger Brake Adjusters.—The Anger Manufacturing and Supply Company, of Bank Chambers, Preston, have received an order to equip all of the 180 trucks now being made by the United Electric Car Company for the Anglo-Argentine Tramways of Buenos Aires with the latest improved type of the Anger brake adjuster. They have also been instructed by the Oldham Corporation tramways to equip all the new trucks now being made for them by the same company with the brake adjusters. In addition to this they have received duplicate orders from the Hong Kong tramways for 50 more sets, and from Johannesburg, Port Elizabeth and Cape Town, An order has also been received to equip with Anger brake adjusters the 25 new trucks just ordered by the Societe Commercial Tramways of Monte Video, Uruguay.

PERSONAL.

Mr. W. T. D. Grundy, of Morecambe, has been appointed general manager of the Derwent Valley light railway.

Mr. M. N. Henderson has been appointed chief mechanical engineer to the Australian Commonwealth railways.

Mr. Philip A. Lange, managing director of the British Westinghouse Company, Limited, has changed his name to Lang. Mr. Lang is of American birth, but has been a naturalised citizen for many years.

Mr. R. S. Tresilian, the well-known secretary of the Dublin United tramways, has been appointed Justice of the Peace for the County of Dublin.

Mr. John Shepherd, a driver in the service of the Aberdeen Suburban Tramways Company, was one of the crew on board the Oceanic, which was recently wrecked off the Scottish coast. He was a member of the Fleet Reserve, and was drafted as a gunner to the crew of the Oceanic, all of whom it will be remembered, have been reported as saved.

Mr. W. J. Pickering has been elected a director of Hadfield's, Limited. Mr. Pickering was appointed to a position on the staff of the company 23 years ago, and has had an extensive experience in various positions in the company. Some years ago he established the South African office of the company at Johannesburg, and on the introduction of electric tramways he was selected to undertake the organisation and control of this department. As manager of the traction department he has travelled extensively and is widely known among railway and tramway engineers in this country and throughout Europe. His many friends will be pleased to learn of the well-deserved recognition which he has received from Sir Robert Hadfield and the directors of the company by his appointment to a seat on the board.

The cars of the Edinburgh Tramways Company were stopped for a quarter of an hour on September 15 as a mark of respect for the late Mrs. Hall Blythe, the wife of the chairman of the company. The funeral took place at St. Mary's Cathedral and was attended by 60 tramway men, members of the 56th Royal Scots, in uniform.

FINANCIAL REPORTS AND MEETINGS.

Madras Electric Tramways (1904).—An interim dividend has been declared on the 6 per cent. cumulative preference shares.

British Insulated and Helsby Cables, Limited.—An interim dividend at the rate of 8 per cent. per annum has been declared.

Millar's Timber and Trading Company.—A dividend at the rate of 6 per cent. has been declared, as compared with 5 per cent. last year.

British Aluminium Company, Limited, announce an interim dividend at the rate of 6 per cent. for the past six months on the preference shares.

The Brazilian Traction, Light and Power Company, Limited, have declared a dividend of 1½ per cent. for the three months ending September 30 on the 6 per cent. cumulative preference shares.

Portsmouth Tramways.—At the September meeting of the Portsmouth Town Council the Tramways Committee submitted their twelfth annual report, which showed that the total revenue for disposal of the year was £60,200. After meeting capital charges and income tax there remains £8,123 for renewals, £3,000 for reserve and insurance fund, and £5,000 in aid of the rates.

Aberdeen Suburban Tramways, Limited.—Mr. James Mearns, chairman, presiding at the half-yearly meeting of the shareholders, said that the company were continuing to make satisfactory progress. They were now finding some advantage in the reduction of the price of electrical energy which they purchase from the Town Council. The renewal and depreciation fund now amounts to £14,000, or nearly one half of the paid-up capital of the company. A dividend at the rate of 2½ per cent. was declared.

Bolckow, Vaughan and Company.—The report for the year ended June 30 last shows that the trading profits were £246,464, and £137,038 was brought forward. The expenditure on plant has been £154,046, of which £132,411 has been charged to capital, and it is proposed to provide the remaining £21,635 out of profits. Debenture interest absorbs £27,947, and a final dividend of 3½ per cent. is recommended on the ordinary shares, making 6 per cent., subject to income tax, for the twelve months, and carrying forward £145,538. The board proposed to pay one-half of the final dividend on October 1 and the remainder at their discretion. A year ago the trading profits were £525,507 and the dividend was 10 per cent. In 1911-12, however, the profits were only £209,893 and the dividend was 5 per cent.

Newcastle Corporation Tramways.—The report of the engineer and general manager of the Newcastle Corporation Tramways, Mr. Ernest Hatton, states that the Corporation now own 64 miles of track, and, including the lines leased, their cars run over a total of 69 miles of single track. The year ended March 31 witnessed still greater progress than was made in either of the two preceding years. The total number of passengers carried was 57,840,666, an increase of approximately 5,750,000. To this expansion of the business must be attributed a large part of the increase in traffic expenses amounting to £7,399. Another reason contributing to this increase are additions to the wages granted to the men during the past year. Including the payments on account of sinking fund, the percentage of profits for the year on the capital expenditure was 9.41. The Corporation now have 200 passenger cars, four motor omnibuses, one water car, and six salt and sand cars, making a total of 211 vehicles. A summary of the accounts is as follows:—Total receipts £261,200 (11.709d. per car mile), working expenses £147,552 (6.614d. per car mile), including maintenance and repairs and public lighting expenses. Including £4,046 for interest received, there is a total balance of £117,734. Interest and loans required £31,256, rent, etc., £1,567, income-tax £3,617; sinking fund and loans repaid £41,450 (equivalent to 2.45 per cent. on capital), unexpired horse tramway loans £1,469, purchase of two chassis £1,236, leaving a balance of £37,134. Of this amount £12,000 has been paid in contribution to rates, and the balance of £25,134 has been appropriated to the reserve and renewal fund, which stands at £94,337.

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WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 60 of the principal undertakings of the United Kingdom for the week ended September 12 give total receipts of £236,632, or £2,195 less than in the corresponding week last year. The total length of track was 2,863 miles, or 24 more than for the corresponding week. Receipts were at the rate of £82 12s. per track mile, a decrease of £1 9s. 5d. as compared with the corresponding week of last year.

THE BRITISH ELECTRICAL FEDERATION.

The traffic statement for the week ended September 11, 1914, shows that the receipts from tramways and railways amounted to £40,371, as compared with £41,941 in the corresponding week last year, and from omnibuses £16,127 as compared with £12,998, making a total of £56,498, as compared with £54,939. The tramway and railway route mileage was 430.54, as compared with 429.82. Upon such of the services as were working both last year and this year the receipts show a decrease of £1,671 upon the week.

THE STOCK AND SHARE MARKET.

On Wednesday the Committee of the Stock Exchange issued a list of minimum prices of trustee and other high class securities and prohibited selling by members at less than the prices quoted. In the case of trustee securities, the prices were only slightly below the prices ruling on July 30, when the Stock Exchange was closed. Home rails were, however, considerably lower. London and North-Western, for instance, standing at 116xd, Great Northern pref. at 42, and Midland pref. at 61. The scheme adopted by the Committee is, of course, only an emergency measure, but it has had the effect of safeguarding borrowers and lenders in the case of Stock Exchange loans, while assisting those who have to negotiate sales. The amount of business continues extremely small, but the better news from France during the past two days has led to more inquiries being made than had been the case previously. Consols are quoted at 68¼, and we append prices at which some tramway securities are understood to have changed hands.

Stock Offered.	Price.	Yield.	Price July 30.
Anglo-Argentine Trams 4½ p.c. Debentures	93½	5 7 0	96
Anglo-Argentine Trams 5½ p.c. 1st Pref.	4⅛	5 17 0	4½
Brazilian Traction	48½		58
British Columbia Electric Ry. 5 p.c. Pref.	96	5 4 0	100
British Electric Traction 4½ p.c. 2nd Debenture	75	6 0 0	78
London General Omnibus Co. 4½ p.c. Debentures	95	4 15 0	100
London General Omnibus Co. 5½ p.c. Debentures	87xd.	6 2 6	88½xd.
Metropolitan Trams 5 p.c. Debentures	86	5 16 0	87
National Steam Car	8/3		9/6
Underground Electric "A."	5/6		6/6

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Anglo-Argentine	Sept. 9	£56,592	£53,640	36	£1,969,043	− £25,185
Auckland..... (28 days)	July 31	18,960	20,782	4½	23,311	+ 1,244
Ballarat and Bendigo	July 19	3,219	2,987	16	14,237	− 137
Brazilian St. Rly. Mlrs.	May	44,820	50,237	43	523,872	+ 76,626
Brazilian Traction.....	July 25	95,720	97,183	4	388,200	+ 8,334
Brisbane	August	29,970	33,172	5	231,827	+ 24,649
British Columbia ..... $	July	755,943	690,023	4	690,023	+ 65,920
Buenos Aires Pt. & City	June	6,791	6,738	26	43,250	+ 3,143
Buenos Aires Lacroze..	July	45,221	43,327	4	43,327	− 1,894
Calcutta..... Rs.	Sept. 12	70,506	66,296	36	24,88,631	+ 1,23,441
Cape Town	June	11,560	12,742	52	155,466	+ 13,249
Carthagena & Herrerias	August	2,192	2,758	35	18,970	− 4,347
Cordoba	July	13,629	14,256	17	56,233	+ 2,542
East India	August	2,005	2,112	52	23,202	+ 916
Kalgoorlie.....	June	2,854	2,692	26	15,522	− 1,704
La Plata.....	July	4,770	4,359	30	33,603	− 2,789
Lima.....	July	34,426	34,600	31	241,931	+ 9,365
Lisbon ..... Mlrs.	July	164,715	171,179	31	1,143,064	+ 45,838
Madras (14 days) Rs.	Aug. 31	28,084	29,529	33	465,638	+ 35,433
Manila.....	June	183,500	182,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	− 5,340
Melbourne	June	56,500	60,500	29	387,500	+ 7,000
Mexico ..... $	July	610,602	628,206	31	4,158,751	+ 283,609
Montevideo.....	August	28,929	24,075	43	309,788	− 6,698
Para	August	24,435	19,354	30	189,946	− 38,540
Port Elisabeth.....	June	3,268	3,212	52	44,931	+ 1,901
Puebla . ..... $	July	56,700	61 000	31	431,800	+ 20,100
Rangoon	August	4,639	4,629	35	41,988	+ 1,358
Shanghai ..... $	July 29	31,168	24,600	30	720,340	+ 94,215
Singapore ..... $	Aug. 8	12 282	11,558	31	379,258	+ 3,699
Toronto ..... $	July	811,966	866,221	31	5,892,147	+ 424,695
Winnipeg..... $	July	336,821	346,630	31	2,438 182	+ 128.987

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913-	Latest Return. 1914.	Latest Return. Incr. or Dec.	Aggregate. Wks	Aggregate. 1913-4.	Aggregate. Increase or Dec.
Aberdeen Corporation..	Sept. 11	£1,707	£1,593	— £114	14	£26,809	+ £844
Accrington Corp.....	,, 9	580	496	— 84	23	13,633	+ 121
Ayr Corporation	,, 12	383	334	— 49	17	8,451	— 162
Bath Electric	,, 9	1,238	1,147	— 91	36	36,129	+ 506
Birkenhead Corp.	,, 13	1,259	1,252	— 7	23½	30,716	— 535
Birmingham Corp.	,, 12	12,072	11,301	— 771	24	292,260	+ 18,225
Blackburn Corporation	,, 9	1,532	1,275	— 257	24	33,461	+ 1,284
Blackpool Corporation	,, 10	4,499	2,550	— 1,949	24	53,131	— 5,869
Bolton Corporation	,, 13	2,698	2,914	+ 216	24	68,514	+ 2,528
Bournemouth Corp.....	,, 16	2,534	1 987	— 547	24	54,435	— 2,007
Bradford Corporation..	,, 12	6 391	5,877	— 514	24	153,146	+ 8,641
Brighton Corporation..	,, 13	1,368	1,276	— 92	23½	29,689	+ 272
Bristol	,, 11	8,710	8,827	+ 117	36½	316,349	+ 20,387
British Elec. Federatn	,, 11	54,939	56,498	*	...	...	...
Burnley Corporation ..	,, 12	1,984	1,469	— 515	24	39,549	— 1,967
Burton-on-Trent Corp.	,, 13	296	301	+ 5	24	7,385	+ 315
Bury Corporation.....	,, 13	1,377	1,483	+ 106	23½	34,334	+ 1,685
Cardiff Corporation....	Aug. 22	2,956	2,762	— 194	20	60,372	+ 2,298
Chatham and District..	Sept. 10	1,020	1,165	+ 145	36	34,250	+ 710
Chesterfield Corp.	,, 10	256	248	— 8	22	6,621	+ 470
Colne Corporation	,, 12	350	230	— 120	...	...	...
Cork Electric.....	,, 10	563	549	— 14	36	18,369	+ 112
Croydon Corporation ..	,, 4	1,530	1,775	+ 245	22	40,831	+ 2,647
Darlington Corporation	Aug. 22	240	262	+ 22	21	5 608	+ 359
Derby Corporation	Sept. 12	996	1,017	+ 21	28½	25,667	+ 1,098
Dover Corporation	,, 12	302	283	— 19	24	6,360	— 148
Dublin & Lucan	,, 11	143	154	+ 11	10½	1,782	— 151
Dublin United	,, 11	3,111	6,027	+ 2,916	36	215,181	+ 1,702
Dundee City	,, 16	1,308	1,259	— 49	17½	28,721	+ 25
East Ham Corporation	,, 12	985	1,234	+ 249	23½	26,786	+ 3,082
Exeter Corporation	,, 11	404	377	— 27	24	8,936	+ 284
Fearless Motor 'Buses.	,, 12	631	539	— 92	37	17.518	+ 6,679
Glasgow Corporation ..	,, 12	20,439	20,609	+ 170	14	303,066	+ 9,958
Glossop (U. Elec. Supply)	,, 12	148	125	— 23	37	4 669	— 126
Halifax Corporation ..	,, 8	2,216	2,310	+ 94	33	54,347	+ 3,315
Hastings & District.....	,, 9	1 498	1,263	— 235	36	38,333	— 1,687
Huddersfield Corp.	,, 12	2,862	2,503	+ 141	24	77,156	+ 5,841
Hull Corporation	,, 12	3,089	3,051	— 38	24	74,868	+ 1,758
Ilford U.D.C.	,, 12	460	594	+ 134	23	13,514	+ 2,591
Ilkeston Corporation ..	,, 16	140	125	— 15	24	3,266	— 57
Ipswich Corporation ..	,, 12	570	475	— 95	24	11,932	+ 229
Isle of Thanet	,, 12	1,514	1,115	— 399	49	31,772	— 2,808
Kilmarnock Corp.	,, 12	168	147	— 21	17	2,989	— 194
Lanarkshire	,, 10	1,815	1,900	+ 85	36	68,758	+ 8,142
Lancashire United	,, 9	1,808	1,793	— 15	36	60,171	+ 4,871
Leeds City	,, 12	8,584	7,831	— 703	24	202,889	+ 4,450
Leicester Corporation..	,, 12	2,844	2,681	— 163	37	106,184	+ 4,017
Leith Corporation	,, 12	706	681	— 25	17	13,263	+ 465
Leyton U.D.C.	,, 3	1,305	1,443	+ 138	21	30,933	+ 1,859
Liverpool Corporation..	,, 5	16,170	13,336	+ 66	35½	471,269	+ 13,286
Llandudno & Colwyn B.	,, 11	681	465	— 216	41	13,853	— 1,733
London County Council	,, 9	41,866	43,541	+ 1,675	23	1,021,883	+ 51,055
London Gnl. Omnibus..	Aug. 1	68,575	71,625	+ 3,050	31	1,982,031	+ 64,894
London United	Sept. 11	6,759	6,249	— 510	37	231,240	— 1 421
Lowestoft Corporation	,, 12	335	248	— 87	49	10,849	+ 103
Maidstone Corporation	,, 3	210	219	+ 9	23	5 117	+ 306
Manchester Corp.....	,, 12	17.787	16,777	— 1,010	24	421,969	+ 3.213
Met. Elec. Trys. ..	,, 11	9,540	9,165	— 372	37	336,876	+ 5,317
Nat. Steam Car Co., Ld.	,, 14	3,788	4 372	+ 584	45	195.675	+ 73,235
Nelson Corporation.....	,, 12	251	162	— 89	23½	4,962	— 260
N'castle-on-Tyne Corp.	,, 12	4,863	5,787	+ 924	24	127,877	+ 12,867
Newport (Mon.) Corp...	,, 12	802	828	+ 26	24	20,459	+ 2,047
New St. Helens & Dist..	,, 9	890	1,089	+ 199	10	10,257	+ 446
Northampton Corp	,, 11	579	647	+ 68	23½	14 197	+ 184
Nottingham Corp.	,, 10	3,311	3,258	— 53	23¼	81,976	+ 3,260
Oldham Corporation ..	,, 13	2,204	1,957	— 247	25	57,786	+ 247
Portsmouth City.....	,, 12	2,818	2,592	— 226	24	62 198	...
Preston Corporation ..	,, 9	885	1,055	+ 170	24	22,379	+ 845
Provincial	,, 12	2,425	2,291	— 134	49	97,335	+ 1,899
Reading Corporation ..	,, 10	746	746	Nil	23	17,350	+ 825
Rhondda.....	,, 10	1,284	1,261	— 23	36	45,116	+ 1,996
Rochdale Corporation ..	,, 12	1,680	1,944	+ 264	24	41,172	+ 1,867
Rotherham Corp.....	,, 16	1,088	1,097	+ 59	24	25,082	+ 1,029
Salford Corporation ..	,, 14	5,206	4,632	+ 574	28	124.144	— 2,114
Sheffield Corporation ..	,, 13	7,488	7,329	— 159	24½	191,668	+ 7,389
Southampton Corp. ...	,, 9	1,462	1,404	— 58	23	33,256	+ 1,175
Southend-on-Sea Corp	,, 9	1,292	1,375	+ 83	24	28,695	+ 2,919
South Met. Trys.	,, 11	1,211	1,163	— 48	37	40,974	+ 8,206
South Shields Corp.....	,, 12	752	737	— 15	23½	19,810	+ 1,648
Sunderland Corp.....	,, 13	1,496	1,448	+ 22	24	37,358	+ 1,544
Sunderland District ..	,, 9	578	535	— 43	45	26.415	+ 1,612
Swindon Corporation ..	,, 9	182	187	+ 5	23	4,295	+ 343
Torquay	,, 10	1,006	612	— 394	36	21.590	— 2,606
Trys. (M.E.T.) 'Buses	,, 12	9,130	8,034	— 1,096	37	330,975	+ 187,441
Tyneside Trys. & Tmrds	,, 9	543	817	+ 274	11	6,551	+ 738
Wallasey Corporation	,, 12	1,294	1,323	+ 29	23	32.604	+ 1,717
Walsall Corporation ..	,, 12	628	636	+ 8	37	23,114	+ 275
Walthamstow U.D.C....	,, 12	801	833	+ 32	24	20,581	+ 2,292
Warrington Corp	,, 3	482	476	— 6	22	9.902	— 130
West Ham Corporation	,, 10	2,718	2 822	+ 104	23	67,554	+ 3,803
Wigan Corporation	,, 3	1,495	1,401	— 94	22	33,485	+ 204
Wolverhampton Corp	,, 16	1,074	964	— 110	25	26,463	— 204
Yorkshire (W. Riding)	,, 13	1,468	1,394	— 74	37	54,202	+ 634

* From such of the services as were working both last year and this year the receipts show a decrease of £1,671 upon the week.

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THE

Tramway & Railway World

Vol. XXXVI. No. 16.] LONDON, SATURDAY, SEPTEMBER 26, 1914. [Established in 1892.

ANNUAL SUBSCRIPTION (Postage Prepaid)—in the United Kingdom, 25s.; for all places abroad, 30s.

Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

URBAN DISTRICT COUNCIL OF COLWYN BAY AND COLWYN.

COUNCIL ELECTRICITY SUPPLY.

The Electricity Committee of the above Council are prepared to receive tenders for the following :—

Specification No.
2.—Turbo Alternators and Jet Condensing Plant.
3.—Water-Tube Boilers, Chain Grate Stokers, Feed Pumps, etc.
4.—E.H.T. and L.T. Switchgear for the Power Station.
5.—Cooling Tower.
6.—Travelling Crane.
7.—Power Station Cabling and Wiring.
8.—Underground Cables.
9.—Rotaries and Statics.
10.—E.H.T. and L.T. Switchgear for the Sub-station.

Copies of the specifications, conditions of contract, etc., for any of the above sections may be obtained upon application to the Consulting Engineer, Mr. E. H. Lacey, M.Inst.C.E., 12, Victoria Street, Westminster, S.W., on payment of three guineas for any one section, which will be returned on receipt of a *bona-fide* tender.

Extra copies of any specification may be obtained on payment of half a guinea, which will not be returned.

Tenders, sealed and endorsed on the outside "Tender for Electricity Works Contract No. ," to be addressed to me, the undersigned, not later than 10 a.m. Tuesday, October 20, 1914.

The Council do not bind themselves to accept the lowest or any tender.

By order, JAMES AMPHLETT,
Clerk to the Council.

Council Offices, Colwyn Bay,
September 18, 1914.

BARRY RAILWAY COMPANY.

The Barry Railway Company are prepared to receive tenders for the supply of General Stores and Materials, including Iron, Oils, Steel, Timber, Varnishes, Waste, Wire Ropes, etc., etc., for the twelve months ending December 31, 1915.

Specifications, with form of tender, may be obtained from the undersigned.

Applicants are requested to particularise the stores for which they wish to tender.

After forms have been obtained, samples and patterns can be seen between the hours of 10 a.m. and 4 p.m. (Saturdays from 10 a.m. to 12 noon) at the Storekeeper's Office, Broad Street, Barry.

Sealed tenders, endorsed "Tender for ——," to be in the hands of the undersigned not later than 10 a.m. on the 5th day of October, 1914.

The Company do not bind themselves to accept the lowest or any tender.

E. T. LAWRENCE,
Secretary.

Company's Offices, Barry Docks, Glam.,
September 17, 1914.

LITTLEBOROUGH URBAN DISTRICT COUNCIL.

ELECTRICITY SUPPLY.

The Littleborough Urban District Council are prepared to receive tenders for the supply and laying of electric cables and erection of plant as follows :—

Contract No. 1.—Removal of Transformer Kiosk and Gear and connection of Mains to New Sub-station. Provision of additional High and Low Tension Cables, Roadwork, etc.
Contract No. 2.—Transformers, Equipment, and Switchgear for New Sub-station.

Persons tendering are at liberty to tender for either or both contracts, but not for part of a contract.

Persons desiring to tender must send in their names and addresses to the undersigned accompanied by a Bank of England note or notes for £5 as deposit on or before October 2. The deposit will be returned on receipt of a *bona-fide* tender. The deposit of the successful tenderer will be retained until the contract has been sealed.

Copies of the specification, with forms of tender, general conditions and plans, all of which must be returned with the tender, will be forwarded to applicants as soon as possible after the deposits are received.

The works are to be carried out in accordance with plans and specifications which may be seen at, but not obtained from, the offices of Mr. W. C. C. Hawtayne, 9, Queen Street Place, London, E.C., Consulting Engineer to the Council, from whom further information can be obtained.

The contractor whose tender is accepted will be required to enter into a formal agreement under seal with sufficient sureties for the due performance of this contract.

Tenders, sealed and marked "Tender for Electricity Supply Plant," must be addressed to the Clerk of the Council, Council Offices, Littleborough, near Manchester, and be delivered to him there on or before Monday, October 12, 1914.

The Council do not bind themselves to accept the lowest or any tender.

GEORGE H. WILD,
Clerk to the Council.

Council Offices, Littleborough,
September 21, 1914.

URBAN DISTRICT OF ERITH.

TO CONTRACTORS.

The Council invite tenders for the Execution of Repairs to their Tramway Track.

A specification may be seen and schedules of the work required to be done obtained at the Surveyor's Office, Bexley Road, Erith, upon payment of £1, which sum will be returned upon receipt of a *bona-fide* tender, and in the case of the successful tenderer upon the execution of the necessary contract.

Tenders, sealed and endorsed "Tramway Track," must be delivered to me not later than 12 o'clock noon on Monday, October 12, 1914.

The Council do not bind themselves to accept the lowest or any tender.

JNO. ATKINSON,
Clerk.

Council Offices, Erith,
September 18, 1914.

BOMBAY, BARODA, AND CENTRAL INDIA RAILWAY.

The Directors are prepared to receive up to noon on Tuesday, October 6, tenders for the supply of :—

Steel Tyres for Carriages and Wagons.

Tenders must be made on forms, copies of which with specification, can be obtained at these offices on payment of 20s. each (which will not be returned).

The Directors do not bind themselves to accept the lowest or any tender.

C. CROMMELIN,
Secretary.

Offices, Gloucester House,
110, Bishopsgate, London, E.C.

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BOROUGH OF HEYWOOD.

ELECTRICITY DEPARTMENT.

The Heywood Corporation is prepared to receive tenders for:—
Converting Plant—

1. A.C. and D.C. Switchgear and Cables.
2. Battery Booster.
3. E.H.T. Overhead Line.
4. E.H.T. Switchgear for Sub-station.

Specification and form of tender can be obtained on application to Mr. R. B. Leach, Borough Electrical Engineer, Electricity Works, Heywood, on payment of the sum of £5 deposit, which will be returned on receipt of a *bona-fide* tender.

Persons tendering for this work must pay their workpeople at least the standard or trade union rate of wages and observe the trade conditions which attach to the various kinds of work for which the tender is sent in.

Sealed tenders, endorsed "Electricity Plant," must be sent to me not later than Saturday, October 17, 1914.

GEO. G. BOUCHIER,
Town Clerk.

Town Clerk's Office, Heywood,
September 18, 1914.

POSITION WANTED.

ENGINEER.

Engineer (electric traction and automobile), long engineering and commercial training in both branches, requires municipal appointment. At present manager and engineer for large motor haulage company, good organiser, leaving present position on account of War Office having commandeered vehicles.

Box 21, The Tramway and Railway World, Amberley House, Norfolk Street, W.C.

POSITION VACANT.

CHIEF OFFICER.

Chief Clerk wanted. A vacancy occurs in the North for a man with first-class knowledge of tramway or omnibus records and accountancy, must also be experienced bookkeeper and capable of controlling general office. Apply, giving full particulars and salary required, to Box No. 100, *Electrical Press*, Fisher Street, Kingsway, W.C.

(Continued on page 243.)

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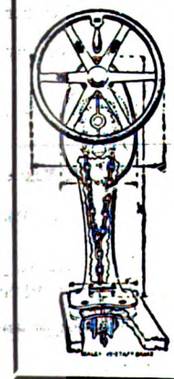

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THE
Tramway AND Railway World

Established in 1892 and Published by

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SATURDAY, SEPTEMBER 26, 1914.

THE "OCEAN"
ACCIDENT AND GUARANTEE CORPORATION, LTD.,
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MOORGATE STREET, LONDON, E.C.

THE WAR AND TRAMWAY SPEEDS.

One of the most curious effects of the outbreak of war was the "speeding-up" of vehicles in London. Several newspapers commented upon this change, and attributed it to the nervous excitement prevailing at the time. It is doubtful, however, whether the increase of speed was due entirely to psychological causes. The pulse of life may beat faster in days of national strain, but there is no definite relation between that phenomenon and the finishing of a tramway journey ahead of schedule time. In all probability the real reason lay elsewhere. Owing to the Government having commandeered vehicles of various kinds, and owing to large numbers of drivers and conductors having been called up for military service, many transport undertakings found themselves short of rolling stock or labour—or both. For the time being, at least, there was no great diminution in passenger traffic, and, therefore, it was necessary for tramway and motor omnibus authorities to cope with a normal volume of business with an abnormally small equipment. Obviously, there was only one way of accomplishing this adjustment, and that was by increasing the average speed. Under the circumstances, more than one every-day traffic rule was suspended; people were much too busy discussing the Kaiser's various ultimatums to worry about speed limits. Moreover, they were probably too busy to notice that although speeds had been increased, there was no corresponding increase in the number of accidents. The change, in fact, supplied a proof that the risk of accident is not a definite function of speed. This is all the more notable because taxi-cabs were apparently following the general tendency to increase their mobility. From the tramway point of view, the attainment of a higher speed was doubtless assisted by the reduction in the volume of slow-moving traffic. At any rate, the tramway manager in more than one district must have been able to provide himself with a demonstration of the advantages of higher schedule speeds. If, in order to attain these advantages, it has been necessary to ignore certain Board of Trade limits of speed, the result is so much the worse for the limits. These limits were fixed during a period of comparative ignorance about the safety of passenger vehicle traffic, and the time has come when they should be revised. The alternative is that they will become a dead letter—a fate which may, of course, already have overtaken them. Speed is of the utmost importance to the usefulness of a tramway system; it also enables the tramway manager to meet the public needs with fewer cars and with economies all round. Undertakings which are working on a small margin of profit have a chance of widening it to comfortable dimensions by continuing the speeding-up, which was one of the indirect benefits conferred on this country by Germany.

TRAMWAYS AND THE WAR.

BRISTOL.—On Tuesday fifty Belgian refugees were received in Bristol, and were taken to Clifton by a special car supplied by the Bristol Tramways Company without charge.

CONDUCTOR E. EVANS, of the Cardiff Corporation tramways, has returned to Cardiff from Netley Hospital to spend a few days at his home before returning to the front. He was wounded at the battle of Mons, in which several other tramway employees of Cardiff were also engaged.

LIVERPOOL.—Mr. C. W. Mallins, general manager of the Liverpool tramways, has informed a correspondent that the Tramways and Electric Power Committee had decided to allow recruits not in uniform to travel free on the cars. Passes are given out at the Territorial headquarters.

BLACKPOOL.—The Admiralty have intimated to the Blackpool Corporation that there is no objection to the electric illumination of the Promenade, and it has been decided that the display will be on a greater scale than previously. This will be satisfactory to the Tramways Department, for which the illuminations are an excellent traffic promoters.

GLASGOW.—The management has had little difficulty in finding men to take the place of the large number of the tramway staff who have joined the forces, about forty men being engaged daily. The car services have been only slightly restricted, but the new men are being trained as quickly as possible, and it is expected that in a few days normal conditions will be restored.

PAISLEY.—At the commencement of the war the employees of the Paisley District Tramways Company decided to form a fund out of which assistance would be given to deserving cases, contributions to the Prince of Wales' Fund, the Red Cross Society, or the Soldiers' and Sailors' Association. Each will contribute twopence per week until the end of the war. Nearly 60 employees have left to join the forces.

BIRMINGHAM.—At a recent meeting of the Tramways Committee Mr. Alfred Baker, the manager, reported that about 700 employees of the department were absent with the colours. The bulk of the men are Army Reservists, but the department is also well represented in the Territorial units and Lord Kitchener's new army. The tramway employees number about 3,500, and the percentage of the total staff now serving the King or about to join the colours with the city battalions is 19.3. The departmental losses are as follow:—Traffic department, 27½ per cent.; works, 10½ per cent.; overhead, 20 per cent.; permanent way, 11 per cent.; shedmen, 9 per cent.; head office staff, 21 per cent.

EDINBURGH.—At a meeting of Edinburgh and District Tramways Company employees Mr. J. M. Dick Peddie, one of the directors, stated that about 220 members of the staff were serving with the colours, either at the front or in the Territorials, and the company handed to their dependents a sum totalling £120 per week. It was unanimously agreed by the meeting that all members of the staff who received more than £1 per week in wages should contribute to the Relief Fund sixpence per week. The total sum given weekly will amount to about £30. The directors of the Tramway Company, who some time ago decided that Territorials in uniform could, for one penny, travel any distance on one car, have extended the privilege to soldiers and sailors in uniform.

Cedes-Stoll Trackless Car at Hove.—Trial runs have been made on the experimental route from the railway station to a point east of the Town Hall *vid* George Street. Many representatives of the Town Council have tested the vehicle, and they seem to be well satisfied with its working. They exhibited much interest in the working of the over-running trolley which is the main feature of the installation. The Cedes Electric Traction Company, Limited, are responsible for the entire equipment.

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MISCELLANEOUS NEWS AND NOTES.

Aberdeen Suburban Tramways Company.—The purchase of the undertaking of the Aberdeen Suburban Tramways Company is to be considered by the Town Council.

Doncaster Extensions.—The construction of the tramway extension to Woodlands Model Village is making good progress. The new line has long been wanted, and it will afford much needed facilities.

Railless Traction Patents.—A specification has been published of a patent by Mr. E. M. Munroe and the R.E.T. Construction Company relating to trolleys for electric traction systems with particular reference to over-running trolleys.

Track Renewal at Norwich.—The Norwich Tramway Company have arranged with the city authorities to continue the renewal of their track with a view to assisting the labour situation. A beginning will be made on Monday next.

Belfast Electricity Works.—The sub-committee have considered the reports of Sir John Snell and Mr. Pratten in respect to the erection of a new station on a site to be obtained on the Hamilton Road, and have endorsed the reports for recommendation to the Council.

Matlock Cable Tramways.—The question of continuing the summer service on the Matlock cable tramway was discussed recently by the Urban District Council, the owners of the line. During August the receipts amounted to £166 and the expenses to £81, 25,368 passengers being carried. Eventually it was decided to run a reduced service.

War in the Electrical Field.—Our contemporary *Electrical Industries* remarks that "it is not generally known that the real object of the searchlights on the Thames Embankment is to guard the Institution of Electrical Engineers from being blown up. Nevertheless," adds our contemporary, "it is generally recognised that a good blowing up would do it a world of good."

A York Extension.—York Electricity and Tramways Committee have given instructions for tenders to be obtained for the construction of a light railway on the Hull Road route. The manager has also been instructed to report as to the equipment of the trolley vehicle routes authorised by the Corporation's Act of this year, and to obtain quotations for the supply of motor omnibuses.

Brunswick-Coburg (Victoria) Tramways Trust.—A committee consisting of members of the Melbourne City Council and the Brunswick and Coburg Councils are considering the report on the projected tramways of the consulting engineer of the Brunswick-Coburg Tramways Trust. The estimated cost is £134,610. It is stated that tenders for most of the work will be called for this year.

The English Electrical Industry.—*Electrical Industries* is publishing a translation of some articles by Dr. Ing Dr. Waldemar Koch on Electrical Industry in Great Britain. Before the war arrangements had been made for the appearance of the articles, and as Dr. Koch's position as manager of the Electrical Company, Limited, sole selling agents of the A.E.G., gave him good opportunities for comparing electrical matters here and in Germany the articles have exceptional interest at the present time.

German Electrical Industry and the War.—It is reported that the Allgemeine Elektricitats Gesellschaft announced at the end of August that in view of the mobilisation it was impossible to make any deliveries. General export business has quite stopped. On war material and aeroplanes three shifts a day were being worked. Since the announcement referred to, conditions must, of course, have become steadily worse, and many German firms have issued new price-lists notifying considerable advances.

Nottingham Improvements.—The newly-constructed Lenton Sands section of the tramways is ready for formal inspection by the Board of Trade, and it is expected that cars will be running by the end of next week. The Tramways Committee has approved a type of omnibus for Dunkirk, but all the vehicles of this kind have been commandeered by the War Office, and there will probably be some delay in obtaining others. A tramway shelter is to be constructed at Gregory Street terminus for the convenience of passengers transferring to the cars from the omnibuses.

No Passes for the Blind at Southend.—A sub-committee have reported that they had considered a request that indigent blind persons in the borough should be granted the privilege of travelling free. Particulars obtained showed that necessitous blind persons were permitted to travel free on the London County Council tramways, and on the Corporation tramways of Manchester, Leeds, Bradford, Glasgow and York. After careful consideration, and while they had every sympathy with the afflicted persons, the committee reported that they could not see their way to grant the application.

Motor Omnibuses at Oldham.—A motor omnibus service was inaugurated in May, 1913, between Oldham Town Hall and the Coppice, while a service of cars has since been run between Moorside tramway terminus and Grains Bar. The Corporation has now three motor omnibuses in stock, and the total capital expenditure on the vehicles amounted to £2,640. The total revenue to March 25, 1914, was £1,325, and the working expenses, £1,617, while the interest on capital was £14, leaving a deficiency of £306. During the year the mileage run was 29,010. and 304,563 passengers were carried. The average revenue per vehicle mile was 10.958d., and the expenses 13.374d. Cars on various routes in Oldham have been frequently delayed, and the service has consequently been disorganised, owing to the breakdown of motor vehicles on the track, Mr. Dugdale, the manager, in his annual report has suggested that the subject should receive the attention of the authorities with a view to minimising the inconvenience thus caused to tramway passengers. As a set-off to this it may be mentioned that a Foden steam wagon, purchased some time ago by the Corporation, has proved very efficient in the conveyance of large consignments of permanent way material from Manchester and the surrounding districts. It has also been the means of considerable saving in expense, as it has rendered unnecessary the hire of team labour.

New York to Boston by Electric Car.—Particulars have been published in some of the American newspapers regarding a run which has been made by an electric street car from Boston to New York and back. The trip was made to further a project of the Bay State Railway Company to promote through traffic between the two cities especially by pleasure seekers. The run has been made possible by the recent completion of a line 30 miles long through thinly settled country between Danielson, Connecticut, and Providence, R.I. It has been possible hitherto to travel between the two cities by electric cars, but to do so the traveller had to go by way of Springfield and Worcester. The total distance of the new route is about 280 miles each way, and two days were allowed for the trip in each direction.

Edinburgh Tramway Affairs.—The Tramway Committee of Edinburgh Town Council have recently had under consideration a motion by Councillors Deas and Graham to consider the existing position of affairs and the present and prospective needs of the city with regard to tramways, and in particular with regard to the taking over and working by the Corporation of the existing tramways; additional routes and extensions desirable now and in the near future; the method of traction to be used, having in view the amenity of the city, the existing system, and the desirability of through working with Leith; and the extended use or otherwise of motor 'buses in connection with the transport service of the city. Opinions on the subject were divided, but ultimately it was decided to bring the matter, along with the question as to arrangements with the lessees, before a special meeting.

Institution of Automobile Engineers.—The Council have decided to proceed with the normal work ol the session and to hold the usual monthly meetings in spite of the absence of a number of officers and other members who are on service and of the difficulties with which a number of firms are faced. It is believed that this will be for the best interests of the industry generally. While recognising that this course will be attended with difficulty, the Council feel that if their efforts are supported by the cordial co-operation of the members who are still following their normal operations and by the press, much good work can be done. It is intended that the papers to be read shall deal with the special difficulties that have been imposed upon automobile engineers by the war. The Council extend a general invitation to the meetings of the Institution to those who are interested in the manufacture of automobiles or components, whether members or not, and full particulars will be sent on application to the secretary.

German Exports of Rails.—The Board of Trade, in pursuance of their plan for helping British manufacturers to capture German export trade, continue the issue of bulletins giving particulars of German exports. One issued recently relates to railway materials of iron and steel (except rolling stock and wheels, tyres and axles). The total value of railway materials of the kinds included exported from Germany during 1912 was £4,531,200. The largest item was railway and tramway rails, the value of which was £2,900,600. By way of comparison the value of corresponding railway materials exported from the United Kingdom during 1913 was £5,189,600. Out of this sum, £3,457,800 represented rails for steam and electric railways, and conductor rails for electric traction, and £156,500 was the value of tramway rails with grooved heads. Germany's principal markets for railway material were the Dutch East Indies, Turkey, Argentina, Sweden, Switzerland, Netherlands, Chile, Brazil, United Kingdom, Japan, and Denmark.

All-British Osram Lamps.—To demonstrate the fact that the well-known "Osram" metal filament lamps are manufactured throughout at their works at Hammersmith, the directors of the General Electric Company invited representatives of the Press on Wednesday last to witness the entire process of manufacture. Some 1,500 hands are regularly employed in these works, which consist of a large building of six floors specially equipped with the most modern plant. The various processes, from the drawing of the tungsten wire to exhausting and sealing of the finished lamp was shown, with the exception of the blowing of the glass bulb. This part of the work is carried out at the company's own glass works at Lemington-on-Tyne where, it is worthy of note, orders are in hand for lamp bulbs for a number of other manufacturers, who previous to the war obtained their supply from glass works on the Continent. After the inspection the visitors were entertained at luncheon, Mr. Ernest Byng presiding, when the speakers included the Mayor of Hammersmith and Mr. Christopher Wilson, manager of the Osram and Robertson works.

The Present Opportunity.—In a recent issue we warned manufacturers that American traders would not fail to seize the opportunity which the present disturbed condition of Europe offered to them to secure new markets and to expand their present trade connections. Already special efforts are being made in this direction. The feeling of many American business men is reflected by Mr. T. C. Martin in some comments in *The Electrical World*, of New York. "It is," he says, "a matter of deep grief that all Europe should thus be plunged in war and that all her energies should be devoted to the destruction of human lives and property; but the war is not of our making or wishing, while, on the other hand, it is *not less a duty* than an opportunity for us to supply the whole world with the electrical apparatus and material which are

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to-day prime necessities of civilisation." No fault can be found with this, and we appreciate the sympathy expressed by our American friends. At the same time we must not lose sight of the fact that commercial competition with the United States will be keener than ever in the future, and that now is the opportunity. The tide is passing to the flood, and if we neglect it we do so at our peril. Never again will there be such opportunities as the present affords. Enterprise involves risk, but without it no expansion in trade ever was obtained. Honour has compelled us to the greatest adventure the world has ever seen; let us not hesitate to make smaller ventures which will fructify and continue fruitful long after the European struggle has been brought to an end.

Brighton Tramway Manager Vindicated.—At a recent meeting of the Town Council, Alderman Wilson, chairman of the Tramways Committee, alluded to a letter received from Mr. Marsh, the general manager and engineer, in which he referred to statements made behind his back which he considered unjust. Alderman Wilson said that Mr. Marsh had a very good defence to the accusation made against him to the effect that he secured economy at the expense of the workmen. Councillor Griffith remarked it was felt among the committee that many of the members had made an unjust and intolerable attack against Mr. Marsh. Continuing the discussion, Mr. Jarvis said that from what he had seen of Mr. Marsh he regarded him as a very worthy officer, and it was very hard on him to be subjected to continuous pin pricks. Mr. Marsh was doing his best, and had effected many economies. He was a big man and he wondered that he had not knocked down some of the committee. The *Brighton Herald*, commenting on the letter, says that facts seemed to show conclusively that so far from sweating the men, Mr. Marsh had always been a good friend to them, yet his critics repeated in substance all the allegations that they levelled against him at the previous meeting of the Council. Our contemporary rightly adds that the criticism of an official charged with upholding discipline amongst a considerable body of men would be more fittingly made in the privacy of the committee room rather than in the Town Council.

CONTRACTS AND ORDERS.

Ayr Corporation have placed an order with Richardsons, Westgarth and Company for a steam turbine generator at £4,940.

Sydney Electricity Committee have accepted the tender of the British Insulated and Helsby Cables, Limited, for feeder cables at £10,638.

The Daimler Company, Limited, have an order from Walsall Tramways Committee for four double-deck and two single-deck motor omnibuses at £4,595.

Babcock and Wilcox, Limited, will supply and erect a coal weigher, conveyor, and boiler house bunkers and jib crane to the Walsall Electricity Committee.

Kaye and Sons, Ltd., Leeds, have received a War Office order for the supply of 3,000 patent seamless oil cans. Over 7,000 of the same type of can have been delivered to the Navy.

Keighley Town Council has accepted the tender of the Cedes Electric Traction Company for two railless trolley vehicles at £806 10s. each, and for a second-hand trolley vehicle at £400.

Bradford 5,000 kw. Plant.—It was stated, though not in these columns, that the British Westinghouse Electric and Manufacturing Company, Limited, had accepted the order from the Bradford Corporation for the Bergmann 5,000 kw. set, for which the order had originally been placed in Germany, at an extremely low figure. The report was improbable, but it is satisfactory to have the statement of the Westinghouse Company to the effect that not only was their original tender price higher than that at which the original contract was placed for the Bergmann set, but also that the price at which the order has now been accepted is higher than the Westinghouse Company's original tender. The higher price was necessitated by the increased cost of raw material which has taken place in the meantime.

PERSONAL.

Mr. Councillor Pridmore, chairman of the Coventry Corporation Tramways Committee, has been invited to become Mayor of the city.

Mr. A. Shelton has been appointed manager of the Manchester branch of Messrs. Berry, Skinner and Company, in succession to the late Mr. R. W. Edge.

Mr. B. H. Antill, director and manager of Siemens Brothers Dynamo Works, Limited, has been elected a member of the Council of the B.E.A.M.A., in the place of Mr. C. Koettgen.

Mr. William Allan Carter, C.E., Edinburgh, the arbiter appointed by the Board of Trade in connection with the arbitration between the Town Council and the Broughty Ferry Tramway Company regarding the taking over of a part of the line between the old Dundee boundary and West Ferry, was in Dundee on the 16th inst., and inspected the part of the line in question.

Mr. L. C. F. Bellamy, borough electrical engineer and tramways manager of Ilkeston, has been granted leave of absence by the Council to enrol in the Divisional Engineer Units and Signal Company of the Royal Naval Division, and has gone into camp at Martin Mill, Kent. The Admiralty recently approached the Institutions of Civil, Electrical and Mechanical Engineers with a view to obtaining picked men for the divisional engineer units of the Royal Naval Division which has recently been formed. As the *Electrical Times* said, in commenting on the request of the Admiralty, "it looks as though the work would be of a very useful and interesting nature; and members of the Institutions of Electrical Engineers who succeed in entering the new body, some 500 strong, should have reason to be highly pleased with themselves."

FINANCIAL REPORTS AND MEETINGS.

Wallasey Tramways.—The general manager, Major R. R. Greene, in his report for the year ended March 31, 1914, states that the traffic receipts for the year under review amounted to £63,150 18s. 1d., as compared with £57,458 2s. 3d. for the previous year, showing an increase of £5,692 15s. 10d., the receipts per car mile being 11.739d. and 10.928d. respectively, or an increase of .811d. per car mile, owing principally to the readjustment of the fare stages at the commencement of the financial year. The working expenses amounted to £40,490 8s., equal to 7.527d. per car mile, as against £37,929 17s., or 7.214d. per car mile for the former year, the increment being chiefly due to a larger amount expended in wages. The net revenue was £23,314 17s. 11d., and has been applied to the payment of interest on capital, sinking fund, instalment on loan, making together a sum of £11,122 5s. 8d., while £3,000 has been passed to depreciation and renewal fund, and a sum of £7,750 credited to the district fund in aid of rates, the balance of £1,136 1s. 2d. being carried forward. The total passengers carried numbered 13,105,204, or 753,198 in excess of the previous year, and the mileage run was 1,291,046, or an increase of 29,191 miles on the preceding twelve months.

Oldham Corporation Tramways.—The general manager, Mr. J. W. Dugdale, has issued his report for the year ended March 25, 1914. The results for the past three years show a sustained and very satisfactory improvement both in gross receipts and net revenue, as will be seen from the appended summary :—

	1914.	1913.	1912.
Income and working expenses—	£	£	£
Traffic receipts	114,480	108,003	101,279
Other receipts	1,689	2,574	819
Total receipts	116,169	116,577	102,009
Working expenses	78,303	73,437	71,184
Gross profits	37,866	37,140	30,914
Deficiency	—	—	2,413
Add bank interest, etc.	1,317	1,358	1,369
Sale of land	—	115	—
Balance to net revenue acct.	39,183	38,613	34,697
Establishment and other charges—	£	£	£
Interest on loans	11,138	11,829	12,004
Contributions to sinking funds	11,718	11,821	11,500
Interest to sinking funds	4,423	3,969	3,444
Rent of leased lines	5,347	5,347	5,347
Income tax deductions	1,352	1,099	1,636
General reserve fund	*4,900	*2,135	†764
Balance (Deficiency) at March 25th, 1912	—	2,413	—
Ditto on motor 'buses	305	—	—
	£39,183	£38,613	£34,697

* Renewals Reserve Fund account. † Purchase of Radcliffe Street Property.

The average total revenue per car mile was 13.422d. compared with 12.946d., and the average working expenses, including power cost, 9.047d., as compared with 8.598d. The car mileage during the past year amounted to 2,077,104 (an increase of 27,188 miles); the number of passengers carried was 22,773,108 (an increase of 1,337,381). The energy consumed decreased from 1.675 to 1.585 units per car mile, and the percentage of working expenses to receipts at 67.4 was 1 per cent. higher. Gross capital expenditure stands at £444,565, and the Corporation now has 92 tramway cars, which run over 23½ miles of route.

(Continued from page 240.)

EAST INDIAN RAILWAY.

ELECTRICIAN.

The Directors of the East Indian Railway Company are prepared to receive applications, by letter only, for appointment as above. Candidate should be between 26 and 30 years of age, and must have served a regular apprenticeship with an engineering firm of repute, and subsequently have gained experience in the running of Electric Power Stations and have a working knowledge of poly-phase and direct-current practice. It is useless for men who do not possess these qualifications to apply.

Salary, Rupees 200 to 240 per month, according to age and qualifications, with a four years' agreement in the first instance, and free passage to India and home again on the satisfactory termination of the engagement. The selected candidate will only be appointed subject to his passing a satisfactory examination by the Company's Consulting Physician.

All candidates must state their age and give particulars as to whether married or single, where apprenticeship was served, and of subsequent experience, stating in each case the name of the firm by whom they were engaged, the class of work upon which they were employed and length of service, giving dates in each instance.

Applications (with copies only of testimonials) should be addressed to the undersigned.

By order, C. W. YOUNG,
Secretary.

28/30, Nicholas Lane, London, E.C.,
September 18, 1914.

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Derby Corporation Tramways.—The report for the year ended March 31, 1914, presented by the manager, Mr. F. Harding, shows a notable improvement over the previous year, as the surplus over all expenses, interest, etc., amounted to £8,193, as compared with £5,870 in the previous year. £5,536 has been carried to the renewals fund, leaving a balance of £2,658. The increase in traffic receipts is attributed partly to the fine weather of last summer and partly to a comparison with the period of the coal strike. The following is a comparison of the results :—

Traffic receipts (electric)	£51,126	+ £4,306
Other receipts	1,048	+ 18
	£52,174	+ £4,324
Working expenses (electric)	34,335	+ 2,358
Gross profit	£17,839	+ £1,966
Net revenue charges, interest, sinking fund, etc. ..	9,473	— 242
Surplus on electric traction	£8,366	+ £2,208
Less loss on horse traction	173	— 115
Surplus for the year	£8,193	+ £2,323
To renewals fund	5,536	—
Net profit for the year	£2,657	—

The average total revenue per car mile was 10.358d., and the average working expenses 6.816d. Energy consumption averaged 1.179 units, the average cost being 1.709d. against 1.694d. The slight increase in the consumption is attributed by the manager to the increased number of roof covers and the heavier traffic. The car mileage amounted to 1,208,880. The ratio of working expenses for the electric lines was 65.8 per cent. of the receipts. The gross capital expenditure stands at £245,332, and the Corporation has 21 miles of track, 50 electric cars and 3 horse omnibuses. The renewals fund at March 31 stood at £27,235.

BUSINESS ANNOUNCEMENTS.

M. EMILE PAUWAERT, of 37, Place du Dock, Ghent, Belgium, asks us to announce that any British manufacturer wishing to obtain any information as to an outlet in Belgium for their goods to replace articles of German manufacture can obtain from him without charge particulars as to the names of firms, etc. Catalogues or samples received will be distributed among interested parties. M. Pauwaert will also supply Belgian addresses of exporting firms.

MESSRS. QUILLIAM BROTHERS, of Salford, ask us to state that they are able to give prompt delivery of Collins' automatic point controllers, of which the Liverpool Corporation have ordered fifty since the beginning of the year.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Angio-Argentine	Sept. 15	£50,168	£51,235	37	£2,020,278	— £24,068
Auckland..... (28 days)	July 31	18,980	20,782	4½	23,311	+ 1,244
Ballarat and Bendigo	July 19	3,219	2,967	16	14,227	— 137
Brazilian St. Rly. Mtrs.	May	44,920	50,257	43	523,872	+ 76,626
Brazilian Traction.....	July 25	95,720	97,183	4	388,200	+ 8,334
Brisbane	August	29,970	33,172	5	231,827	+ 24,649
British Columbia .....$	July	755,943	690,023	4	690,023	+ 65,920
Buenos Aires Pt. & City	June	6,791	6,738	26	43,250	+ 3,143
Buenos Aires Lacroze...	July	45,221	43,327	4	43,327	— 1,894
Calcutta.....Rs.	Sept. 19	81,096	66,051	37	25,54,682	+ 1,08,396
Cape Town	June	11,560	12,742	52	155,466	+ 18,249
Carthagena & Herrerias	August	2,192	2,758	35	18,970	— 4,347
Cordoba.....	July	13,629	14,256	17	56,238	+ 2,542
East India	August	2,005	2,112	4	2,112	+ 107
Kalgoorlie.....	June	2,854	2,692	26	15,522	— 1,704
La Plata.....	July	4,770	4,359	30	33,603	— 2,739
Lima.....	July	34,426	34,600	31	241,931	+ 9,365
Lisbon ..... Mtrs.	July	164,715	171,179	31	1,145,064	+ 45,838
Madras (14 days) Rs.	Aug. 31	28,084	29,589	33	4,65,638	+ 35,433
Manila.....	June	133,500	132,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	387,500	+ 7,000
Mexico .....$	July	610,602	628,206	31	4,158,751	+ 282,609
Montevideo.....	August	28,829	26,075	43	309,788	— 6,698
Para	August	24,485	19,354	39	189,946	— 38,540
Port Elizabeth.....	June	3,268	3,212	52	44,931	+ 1,901
Puebla .. ..$	July	56,700	51,000	31	431,800	+ 20,100
Rangoon	August	4,639	4,629	35	41,988	+ 1,856
Shanghai .....$	July 29	31,163	24,600	30	720,340	+ 94,215
Singapore .....$	Aug. 15	12,790	10,360	33	389,618	+ 1,269
Toronto .....$	July	811,966	866,291	31	5,892,147	+ 424,695
Winnipeg .....$	July	336,821	346,630	31	2,488,182	+ 128,967

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	Latest Return. 1914.	Latest Return. Incr. or Dec.	Aggregate. Wks.	Aggregate. 1913-4.	Aggregate. Increase or Dec.
Aberdeen Corporation..	Sept. 16	£1,644	£1,547	— £97	15	£23,356	+ £747
Accrington Corp.....	,, 16	557	492	— 65	24	14,125	+ 55
Ayr Corporation	,, 19	932	413	— 519	18	8,864	— 681
Bath Electric	,, 16	1,199	908	— 291	37	37,038	+ 615
Birkenhead Corp.	,, 20	1,314	1,247	— 67	24½	31,962	— 608
Birmingham Corp.	,, 19	12,201	11,438	— 763	25	303,699	+ 17,462
Blackburn Corporation	,, 16	1,261	1,244	— 17	25	34,705	+ 1,242
Blackpool Corporation	,, 17	3,106	1,820	— 1,286	25	54,951	— 7,287
Bolton Corporation	,, 20	2,780	2,597	— 183	25	71,111	+ 2,045
Bournemouth Corp.....	,, 23	2,387	1,877	— 510	25	56,312	— 2,517
Bradford Corporation..	,, 19	5,718	5,750	+ 7	25	158,896	+ 8,648
Brighton Corporation..	,, 20	1,254	1,102	— 152	24½	30,791	+ 120
Bristol	,, 18	9,079	8,693	— 386	37½	325,042	+ 20,000
British Elec. Federatn.	,, 11	54,939	56,498	*	...	...	...
Burnley Corporation ..	,, 19	1,660	1,405	— 255	25	40,954	— 2,222
Burton-on-Trent Corp.	,, 26	296	295	— 1	25	7,680	+ 314
Bury Corporation.....	,, 20	1,420	1,361	— 59	25	36,294	+ 1,826
Cardiff Corporation....	Aug. 29	2,969	2,753	— 216	21	63,126	+ 2,092
Chatham and District..	Sept. 17	1,031	1,041	+ 10	37	35,291	+ 721
Chesterfield Corp.	,, 17	257	241	— 16	23	6,879	+ 471
Colne Corporation	,, 19	269	244	— 25	...	...	...
Cork Electric.....	,, 17	501	485	— 16	37	18,855	+ 97
Croydon Corporation ..	,, 11	1,642	1,719	+ 77	23	42,550	+ 2,724
Darlington Corporation	Aug. 22	240	262	+ 22	21	5,608	+ 359
Derby Corporation	Sept. 19	966	973	+ 7	24½	26,060	+ 1,106
Dover Corporation	,, 19	275	266	— 9	25	6,627	— 156
Dublin & Lucan	,, 18	119	132	+ 13	11½	1,913	— 139
Dublin United	,, 18	3,162	5,585	+ 2,423	37	220,716	+ 4,101
Dundee City	,, 23	1,326	1,214	— 112	18½	24,986	— 87
East Ham Corporation ..	,, 19	981	1,200	+ 219	24½	27,966	+ 3,300
Exeter Corporation	,, 18	369	356	— 13	25	9,292	+ 271
Gearless Motor 'Buses.	,, 19	605	502	— 103	38	18,019	+ 6,575
Glasgow Corporation ..	,, 19	20,873	20,042	— 831	15	323,108	+ 9,580
Glossop (U.Elec.Supply)	,, 19	142	119	— 23	38	4,788	— 149
Halifax Corporation ...	,, 15	2,163	1,977	— 186	24	56,324	+ 3,129
Hastings & District.....	,, 16	1,408	1,041	— 367	37	39,374	— 2,054
Huddersfield Corp.	,, 19	2,048	2,187	+ 139	25	79,348	+ 5,981
Hull Corporation	,, 19	3,126	2,984	— 142	25	77,853	+ 1,609
Ilford U.D.C.	,, 19	445	577	+ 132	24	14,092	+ 2,714
Ilkeston Corporation ...	,, 23	138	122	— 16	25	3,386	— 73
Ipswich Corporation ..	,, 19	536	427	— 109	25	12,859	+ 92
Isle of Thanet	,, 19	1,076	915	— 161	50	32,686	— 2,969
Kilmarnock Corp.	,, 19	177	157	— 20	18	3,146	— 215
Lanarkshire	,, 17	1,673	1,750	+ 77	37	70,508	+ 8,219
Lancashire United	,, 16	1,736	1,566	— 170	37	61,748	+ 4,697
Leeds City	,, 19	8,605	7,765	— 840	25	210,155	+ 8,544
Leicester Corporation..	,, 19	2,827	2,612	— 215	38	108,796	+ 3,760
Leith Corporation	,, 19	707	648	— 59	18	13,911	+ 406
Leyton U.D.C.	,, 17	1,323	1,297	— 26	23	33,659	+ 1,903
Liverpool Corporation..	,, 19	12,924	12,923	— 2	37½	497,457	+ 18,259
Llandudno & Colwyn B.	,, 18	515	393	— 122	42	13,646	— 1,205
London County Council	,, 16	42,339	42,526	+ 187	24	1,064,358	+ 51,242
London Gnl. Omnibus..	Aug. 1	68,575	71,625	+ 3,050	31	1,982,031	+ 64,894
London United	Sept. 13	6,705	5,572	— 1,133	37	236,808	— 2,559
Lowestoft Corporation	,, 19	279	210	— 69	50	11,060	+ 34
Maidstone Corporation	,, 17	231	221	— 10	25	5,562	+ 302
Manchester Corp.....	,, 19	17,227	16,330	— 897	25	438,299	+ 2,099
Met. Elec. Trys.	,, 18	9,468	8,176	— 1,292	35	345,052	+ 4,025
Nat. Steam Car Co., Ltd.	,, 21	3,695	4,183	+ 488	46	199,858	+ 73,723
Nelson Corporation.....	,, 19	190	158	— 32	24½	5,120	— 291
N'castle-on-Tyne Corp.	,, 19	4,883	5,765	+ 882	25	138,642	+ 13,749
Newport (Mon.) Corp...	,, 12	802	828	+ 26	24	20,459	+ 2,047
New St. Helens & Dist..	,, 16	822	996	+ 168	11	11,283	+ 617
Northampton Corp.....	,, 18	597	615	+ 18	24½	14,812	+ 202
Nottingham Corp.	,, 17	3,394	3,207	— 187	24½	85,004	+ 3,072
Oldham Corporation ..	,, 18	2,204	1,957	— 247	25	57,786	+ 247
Portsmouth Corp.....	,, 19	2,440	2,326	— 114	25	64,524	...
Preston Corporation ...	,, 16	871	1,032	+ 161	25	23,404	+ 1,006
Provincial	,, 19	2,187	2,070	— 117	50	99,406	+ 1,774
Reading Corporation ...	,, 18	690	716	+ 26	24	18,077	+ 851
Rhondda.....	,, 10	1,284	1,261	— 23	36	45,116	+ 1,936
Rochdale Corporation	,, 19	1,561	1,484	— 77	25	42,656	+ 1,788
Rotherham Corp.....	,, 23	1,015	1,089	+ 74	25	26,172	+ 1,108
Salford Corporation ...	,, 21	5,162	4,682	— 480	24	128 827	— 2,578
Sheffield Corporation...	,, 20	7,538	7,380	— 158	25½	199,048	— 7,220
Southampton Corp.....	,, 16	1,451	1,263	— 188	24	34,519	+ 986
Southend-on-Sea Corp.	,, 16	1,257	1,162	— 95	25	29,858	+ 2,924
South Met. Trys.	,, 18	1,228	1,071	— 157	38	42,045	+ 8,049
South Shields Corp.....	,, 19	700	727	+ 27	24½	20,087	+ 1,659
Sunderland Corp.....	,, 20	1,475	1,354	— 121	25	38,712	+ 1,423
Sunderland District ...	,, 16	540	538	— 2	46	26,958	+ 1,610
Swindon Corporation ...	,, 16	172	179	+ 7	24	4,475	+ 348
Torquay	,, 17	840	550	— 290	37	22,141	— 2,996
Trys. (M.E.T.) 'Buses	,, 19	8,928	5,256	— 3,672	38	336,230	+ 183,768
TynesideTrys. & Tmrds	,, 16	513	739	+ 226	12	7,390	+ 959
Wallasey Corporation	,, 19	1,186	1,259	+ 73	24½	33,914	+ 1,780
Walsall Corporation ...	,, 19	626	615	— 11	38	23,729	+ 264
Walthamstow U.D.C....	,, 19	749	752	+ 3	25	21,333	+ 2,295
Warrington Corp.....	,, 17	487	488	+ 1	24	10,773	+ 127
West Ham Corporation	,, 17	2,701	2,764	+ 63	24	70,318	+ 3,366
Wigan Corporation	,, 17	1,451	1,385	— 76	24	36,288	+ 23
Wolverhampton Corp	,, 23	1,072	932	— 140	26	27,395	— 344
Yorkshire (W. Riding)	,, 20	1.465	1,387	— 79	38	55,589	+ 555

* From such of the services as were working both last year and this year the receipts show a decrease of £1,671 upon the week.

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THE

Tramway & Railway World

Vol. XXXVI. No. 17. | LONDON, SATURDAY, OCTOBER 3, 1914. | [Established in 1892.

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Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

BURMA RAILWAY COMPANY, LTD.

The Board of Directors of the Burma Railways Company, Limited, are prepared to receive tenders for the supply of :—

387,450 Steel Screw Spikes for 60lbs. Rails.

For each specification a fee of 10s. will be charged, which is not returnable.

Tenders, enclosed in sealed envelopes addressed to the Chairman and Directors, and endorsed "Tender for Steel Screw Spikes," must be delivered at the Company's Office not later than noon on Tuesday, October 13, 1914.

The Directors do not bind themselves to accept the lowest or any tender, and reserve the right to divide the order.

By order of the Board,
W. HOME,
Managing Director.

109, Gresham House, Old Broad Street, London, E.C.,
October 2, 1914.

URBAN DISTRICT COUNCIL OF COLWYN BAY AND COLWYN.

COUNCIL ELECTRICITY SUPPLY.

The Electricity Committee of the above Council are prepared to receive tenders for the following :—

Specification No.

2.—Turbo Alternators and Jet Condensing Plant.
3.—Water-Tube Boilers, Chain Grate Stokers, Feed Pumps, etc.
4.—E.H.T. and L.T. Switchgear for the Power Station.
5.—Cooling Tower.
6.—Travelling Crane.
7.—Power Station Cabling and Wiring.
8.—Underground Cables.
9.—Rotaries and Statics.
10.—E.H.T. and L.T. Switchgear for the Sub-station.

Copies of the specifications, conditions of contract, etc., for any of the above sections may be obtained upon application to the Consulting Engineer, Mr. E. H. Lacey, M.Inst.C.E., 12, Victoria Street, Westminster, S.W., on payment of three guineas for any one section, which will be returned on receipt of a *bona-fide* tender.

Extra copies of any specification may be obtained on payment of half a guinea, which will not be returned.

Tenders, sealed and endorsed on the outside "Tender for Electricity Works Contract No. ," to be addressed to me, the undersigned, not later than 10 a.m. Tuesday, October 20, 1914.

The Council do not bind themselves to accept the lowest or any tender.

By order, JAMES AMPHLETT,
Clerk to the Council.

Council Offices, Colwyn Bay,
September 18, 1914.

CORPORATION OF LEICESTER.

ELECTRIC TRAMWAYS.

BOW BRIDGE WIDENING.

The Tramways and Electricity Committee of the Corporation of Leicester are prepared to receive tenders for the supply and erection of Steel Plate Girders, Steel Troughing, etc., for the Widening of the Bow Bridge over the River Soar in King Richard's Road, and for other works in connection therewith.

Plans may be seen and copies of the general conditions, specification, and bills of quantities obtained at the Borough Surveyor's Office on and after Monday, October 5, 1914, on payment of the sum of £1, which will be returned on receipt of a *bona-fide* tender.

Cheques, etc., should be made payable to the Leicester Corporation.

Sealed tenders, on the forms supplied, addressed to the Chairman of the Tramways and Electricity Committee, Town Hall, Leicester, are to be delivered not later than 12 noon on Saturday, October 17, 1914, endorsed "Tender for Steelwork for Bow Bridge."

The Committee do not bind themselves to accept the lowest or any tender.

E. GEORGE MAWBEY, M.Inst.C.E.,
Borough Engineer and Surveyor.

Town Hall, Leicester,
September 29, 1914.

MADRAS AND SOUTHERN MAHRATTA RAILWAY COMPANY (LIMITED).

The Directors are prepared to receive tenders for :—

(1) About 4,086 tons Steel Rails.
(2) About 165 tons Steel Fishplates,
(3) About 105 tons Steel Screw Spikes,

in accordance with the specifications, which may be seen at the offices of the Company. The charge for each specification is one guinea, which will not be returned.

Tenders must be sent in, addressed to the Secretary, not later than 2 p.m., on Tuesday, October 20, 1914, marked "Tender for Rails," or as the case may be.

The Directors do not bind themselves to accept the lowest or any tender.

Company's Offices :
91, York Street, Westminster, S.W.,
September 29, 1914.

SOUTH INDIAN RAILWAY COMPANY, LTD.

The South Indian Railway Company, Limited, are prepared to receive tenders for the supply of :—

No. 1. Locomotive Tank Engines, Metre Gauge, 7 "A" Class, 0-4-4 Superheated.

No. 2. Laminated, Volute and Helical Springs.

No. 3. Rolling Stock, Broad Gauge, 13-60ft. Carriage Underframes, and 5-24ft. Horsebox Underframes.

Specifications and forms of tender may be obtained at the Company's Offices.

Tenders, addressed to the Chairman and Directors of the South Indian Railway Company, Limited, marked "Tender for Locomotives," or as the case may be, must be left with the undersigned not later than 1 o'clock on Wednesday, October 14, 1914.

A charge, which will not be returned, will be made of 40s. for each copy of Specification No. 1, and a charge of 20s. for each copy of Specifications Nos. 2 and 3.

Copies of the drawings may be obtained at the office of Robert White, Esq., M.Inst.C.E., Consulting Engineer to the Company, 3, Victoria Street, Westminster, S.W.

By order, V. E. DE BROE, M.Inst.C.E.,
For Managing Director.

Company's Offices,
91, York Street, Westminster, S.W.,
September 29, 1914.

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COUNTY BOROUGH OF WARRINGTON.

ELECTRICITY DEPARTMENT.

The Electricity and Tramways Committee of the County Borough of Warrington invite tenders for the supply of Sub-Station Ironclad Switchgear.

Specification and form of tender can be obtained from the undersigned on payment of one guinea, which will be returned on receipt of a *bona-fide* tender. Five shillings will be charged for extra copies of specification.

Tenders, addressed to the Chairman of the Electricity and Tramways Committee, Town Hall, Warrington, must be sealed with wax and endorsed "Tender for sub-Station Ironclad Switchgear," and delivered not later than 12 o'clock noon on Tuesday, October 13, 1914.

The lowest or any tender will not necessarily be accepted.

F. V. L. Mathias,
Borough Electrical and Tramways Engineer.

Howley, Warrington.

POSITION VACANT.

BOROUGH OF DARLINGTON.

JUNIOR ENGINEER-IN-CHARGE.

Applications are invited for the position of Junior-Engineer-in-Charge at the Darlington Corporation Electricity Works. Salary £2 per week. The applications must be made on special forms, which can be obtained from the Borough Electrical Engineer, Electricity Works, Darlington, and they must reach me not later than October 12.

H. G. Steavenson,
September 30, 1914. Town Clerk.

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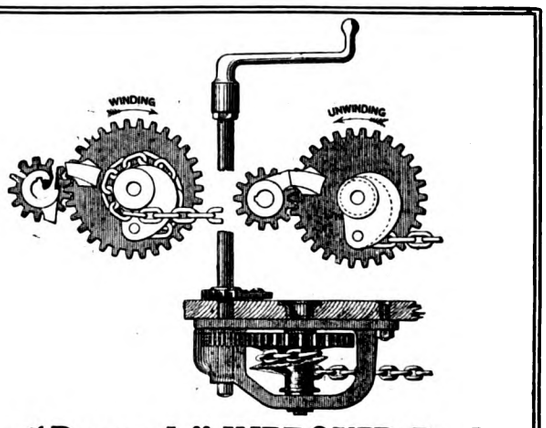

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THE
Tramway and Railway World

Established in 1892 and Published by

THE TRAMWAY & RAILWAY WORLD PUBLISHING CO., Ltd.,
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SATURDAY, OCTOBER 3, 1914.

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THE BRISTOL TRAMWAY POSITION.

The report by the Tramways Option Committee of Bristol Corporation, which we reproduce in this issue, is of much interest to all concerned in British tramways, whether from the municipal or the company point of view. The main facts with which the report deals are tolerably well known, but they are spread over a considerable period of time, and it is well to have them collected and presented in proper sequence, as the Committee have done. The burden of the report is really a history of the chequered course of the Bill which the Corporation promoted in last session of Parliament, and which received the Royal Assent on August 7. The original object of the Bill was to enable the City Council to work the tramway undertaking within the city if they acquired it from the present owners, the Bristol Tramways and Carriage Company. Most of the tramways are compulsorily purchasable in May next, but about five miles of route, partly outside the city, cannot be bought till 1946 unless by agreement. The Bill applied to the former lines and to any other tramways which the Corporation might subsequently acquire. The House of Lords Committee on the Bill inserted a clause providing that the powers to work the tramways could only be obtained by the Corporation accepting an obligation to buy the tramways which they had the option to purchase next year, and also the remainder of the tramways not subject to that option. A poll of the ratepayers resulted in favour of purchase, but when subsequently the Bill came before a House of Commons Committee the Lords' clause was modified so as practically to restore the Bill to its former state, except that, if the Council buy the tramways on which they have the option next year, they must also buy the remainder in the city. These things being so, the Tramways Option Committee feel that they are in an equitable position to enter into negotiations with the tramway company. The proposal accordingly is that, before recommending that statutory notice to purchase should be given to the company, the Commitee should negotiate with the company to ascertain what rent or other sum the company would be willing to pay to the Corporation if the latter agree to refrain from exercising their option for 7, 14, or 21 years. The word rent is hardly the appropriate one in the circumstances; wayleave would better express what is really a consideration for being allowed to remain in possession. What the outcome will be remains to be seen. At this time of day the Corporation can hardly be blamed for desiring to buy the tramways; municipalisation of such undertakings is now a widely accepted policy. On the other hand, the Bristol company have done well for the city in providing a highly efficient system. The company are in a much better position than most tramway companies were in when they were bought out by local authorities. The company have developed a large and prosperous public motor vehicle service, and, while the tramway undertaking has for some years reached practically full development, the motor undertaking has been growing rapidly and no limit seems yet to be reached. The motor undertaking cannot be compulsorily bought by any local authority, and it will be a question for the company to decide whether they will sell the tramways (mostly under Tramways Act terms) and confine themselves to developing the motor vehicle business, or whether they will continue to work the tramways, paying so much a year for the privilege. That may resolve itself simply into a question of how much.

TRAMWAYS AND THE WAR.

TORQUAY.—Out of 100 employees of Torquay Tramways Company no fewer than 30 have enlisted.

DUNDEE.—It has been found necessary to employ a number of temporary hands in the tramway department owing to the number of employees who have enlisted.

HALIFAX.—In connection with the recruiting campaign in Halifax, illuminated decorated cars are sent out at night and bands of music are employed in connection with these outings.

BURNLEY.—The following statement is atttributed to a Burnley car driver who has been serving at the front in the King's Own Lancaster Regiment, and who has been invalided home:—"The French treated the English Tommies like gods. If we had been King of England they could not have done more for us. I was never in a grander country."

SOUTHAMPTON.—The most recent report by the Tramways Committee shows that 42 of the employees have joined the colours, nearly all of whom were drivers and conductors. New men have been taken on to fill the temporary vacancies and holidays have been suspended, with the proposal that a week's wages in lieu of holidays should be given.

BELFAST.—In consequence of such a large number of men in the employment of Belfast Corporation Tramways having joined the colours and of the traffic receipts having fallen by about £500 per week, Mr. Nance, the general manager, has found it necessary to reduce the number of cars in service during the quiet hours of the day. The number of cars during the busier hours has, however, been increased.

CROYDON.—Three naval reservists, who were in the employment of Croydon Corporation as tramway car drivers, have had remarkable escapes from death. When they were called up for service one was appointed to the cruiser Cressy, another to the Amphion, and a third to the Aboukir. The first two missed their ships and were appointed to others, the third went to sea in the Aboukir and was aboard when she was torpedoed, but he was rescued.

NORTHAMPTON.—A meeting of ratepayers on Wednesday night passed a resolution of protest against the retention of Mr. J. Gottschalk as manager of the municipal tramways of the borough. Though born in Germany Mr. Gottschalk has lived in England for over 30 years, and he applied for naturalisation papers after the outbreak of the war. It will be remembered that recently the Tramways Committee passed a vote of confidence in Mr. Gottschalk.

DARWEN.—Mr. F. J. S. Hosken, general manager of Darwen Corporation tramways, has instituted a miniature rifle club, the object being to teach men how to handle a rifle and to shoot straight. The range, which is situated in a large room under a billiard hall, was formally opened on Monday by the Mayor (Alderman James Cocker). Mr. Hosken is acting as honorary secretary, and he has the support of a strong committee. There is no charge for membership, and ammunition is supplied at 10 shots for 2d. Rifles are provided and instructors have offered their services.

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BRISTOL TRAMWAYS.

The Proposed Purchase by the Corporation.

The Tramways Option Committee of Bristol Corporation have presented a report which gives a narrative of procedure in connection with the Act recently passed to enable the Corporation to work the tramway undertaking of the Bristol Tramways and Carriage Company should the Council acquire it, and also proposes that negotiations should be entered into with the company to ascertain what rent the company would be willing to pay should the Council refrain from purchasing. The report says :—

Your committee beg to report that the Bill promoted by the Council for the purpose of enabling the Corporation to work any tramways which they might acquire received the Royal Assent on August 7 last; and in order to explain the exact relation in which the Corporation and the Bristol Tramways and Carriage Company, Limited, now stand towards each other, your committee think it as well to set out in detail what has happened from the time when the Bill was promoted to the date when it became an Act of Parliament.

The Council will remember that when, at their meeting on September 9, 1913, they adopted the report of your committee recommending the promotion of the Bill, they passed the following resolutions :—

1. That application be made to Parliament in the ensuing Session for powers to enable the Corporation to work the tramway undertaking within the city, if acquired, and to raise the purchase money to be paid by the Corporation.

2. That a clause be inserted in the proposed Bill enabling the Corporation to take a poll of the city on the question of giving notice to acquire the tramway undertaking in the manner prescribed by the Borough Funds Act, 1903, and to pay the costs of taking such poll out of the borough fund or rate.

3. That this Council undertake, in the event of such power being obtained, and so far as they can bind their successors, that a poll of the city shall be taken on the question whether the city shall purchase the tramway undertaking, before the matter is finally decided upon.

The Council will also recollect that, at the date of the deposit of the Bill, the position of the Corporation with reference to the acquisition of the tramways within the city was as follows :—

1. The tramways within the city as constituted prior to 1904 (except the Hanham Light Railway), and comprising a route mileage of about 25 miles, were compulsorily purchaseable in May, 1915, or within six months thereafter, on the terms of Section 43 of the Tramways Act, 1870 (commonly known as tramways terms).

2. So much of the Hanham Light Railway as is within the city and comprising a route mileage of about 1¼ miles was compulsorily purchaseable in November, 1928, upon terms of paying the fair market value as a going concern, but without any allowance for compulsory purchase (commonly known as light railway terms).

The remainder of the tramways, comprising about 4¾ route miles, of which a little over two miles only are within the city, were compulsorily purchaseable in 1946 by the authorities in whose districts they are situate, on light railway terms (except as regards a short extension at Staple Hill, which was purchaseable in June, 1918, on tramway terms).

The Bill, therefore, as introduced, only sought powers to enable the Corporation to work the tramways which they had the option to acquire compulsorily next year and any other tramways which they might subsequently acquire, these statutory powers being necessary owing to the fact that although the Corporation had power to acquire the tramways undertaking they had not under the Tramways Act, 1870, power to work any tramways when acquired. With the object of serving the public convenience and maintaining through traffic, clauses were also included in the Bill enabling the Corporation by agreement with the Bristol Tramways and Carriage Company to purchase, take on lease, and make agreements for mutual running powers with respect to the tramways not purchaseable by the Corporation until after 1915, or outside the city, as without the consent and approval of the company these arrangements could not be carried into effect.

The Council will remember that the Bill was considered by a Select Committee of the House of Lords, when, as a result of the opposition to the Bill by the Bristol Tramways and Carriage Company, the Select Committee amended it by inserting a clause quoted in the report, the effect of which was that the powers to work the tramways which the Corporation were seeking could only be obtained by their accepting an absolute obligation to purchase the tramways which they had the option to purchase in May, 1915, and also the remainder of the company's tramways not subject to the option.

In these circumstances your committee were bound carefully to consider the question as to whether they should advise the Council to accept this obligation or abandon the Bill, and as a result of their deliberations they came to the conclusion that it was in the interests of the city to accept the obligation to purchase the undertaking and to proceed with the Bill. Having regard, however, to the fact that the Council had by their resolution of September 9, 1913 (set out above), pledged themselves to take a poll of the city before finally deciding to purchase the undertaking, your committee felt that it was essential to obtain the opinion of the citizens at once, before proceeding further with the Bill, rather than defer the poll to the autumn of this year or the spring of next year as was originally intended, and they therefore presented their report dated May 14 last, to the Council, recommending them to accept the Bill as amended by the House of Lords Committee subject to a poll of the city being favourable to the acquisition of the undertaking. The Council considered this report on May 26 last when they passed the following resolutions :—

1. That the report be approved.

2. That in the event of the parochial electors approving of the acquisition by the Corporation of the Bristol Tramways undertaking, this Council hereby resolves to accept and proceed with the Bristol Corporation (Tramways) Bill as amended by the House of Lords.

3. That the Council do at once proceed to ascertain the opinion of the parochial electors on the question of the purchase by the Corporation of the said undertaking by means of a poll of the city.

As the Council are aware, a poll of the parochial electors was taken on June 13 last, and resulted in a majority of 3,163 in favour of purchasing the tramways undertaking.

When the Bill was introduced into the House of Commons various petitions were presented against it, some of which were disallowed, and the petitioners who were eventually heard before the Select Committee of the House of Commons in opposition to the Bill, consisted entirely of persons describing themselves as owners, lessees, and occupiers of property in the city of Bristol. On the other hand, a petition against alterations being made in the Bill as amended by the House of Lords Committee was lodged by the Bristol Tramways and Carriage Company.

The Select Committee of the House of Commons decided that they could not acquiesce in the obligatory part of the clause which had been inserted by the Lords' Committee, and the clause was therefore amended in such a way as to preserve to the Corporation their option with regard to the purchase of the undertaking next year, thus replacing them in this respect in the position in which they were at the time the Bill was deposited. The Corporation, however, still have the obligation placed upon them of acquiring the tramways not subject to the option next year if they decide to exercise their option with regard to the remainder, but your committee are of opinion that such an obligation cannot but be for the benefit of the city, as it will ensure that the public convenience and the maintenance of through traffic over the undertaking will be secured.

As a result therefore of the passing of the Bill, the Corporation are now in a position to work the tramways if they decide to acquire them, and your committee therefore feel that they are in an equitable position to enter into negotiations with the Bristol Tramways and Carriage Company with reference to the undertaking.

Having regard therefore to the present position, and before recommending the Council to give the required statutory notice to purchase the tramways undertaking, your committee recommend that they be authorised to negotiate with the company, provided the company express their willingness to enter into such negotiations, with the view of ascertaining what rent or other sum the company would be willing to pay to the Corporation if the latter agreed to refrain from exercising their option of purchase for 7, 14, or 21 years.

The report came before a meeting of the Corporation on Tuesday, when after some discussion it was adopted.

THE TRANSFER OF SHEFFIELD POWER STATION.

A little ceremony took place in the early hours of Wednesday morning at Kelham Island tramway power station, Sheffield, to mark the transfer of that station to the management of the Electricity Supply Committee. As already reported, the Corporation had decided to place all their electric stations under one control and to carry out extensions at Neepsend rather than Kelham, the former being the more suitable. Representatives of the Corporation and a number of the officers concerned met at Kelham at midnight formally to carry out the transfer.

Alderman Knowles, who presided, pointed out that the capital expenditure represented in the transfer was £320,900, of which £98,000 had been repaid on loan. The station was capable of delivering on to the tramway wires from 18 to 19 million units in twelve months, and it had made a reputation for its capacity to maintain the power and keep the cars running without breaks. The amalgamation would mean an increase of 35,000 to 40,000 tons of coal per year on the present contracts of the Electric Supply Department, and this ought to result in advantages in contracting. In carrying out the new policy the municipality had taken a larger view than merely a departmental one, and the transaction would no doubt be in the interests of the city. The cost of working the station in the past ten years had been kept at a very low figure—he believed, lower than any in the country. It was a great credit to the management. Now, possibly, the Tramways Department would have to pay more for their power, but the increased cost could be met by economies which were possible in other directions.

Councillor T. G. Evans (chairman of the Electric Supply Committee) accepted the transfer. He believed that ultimately the change would be of great benefit to the city. Councillor W. C. Fenton, an old member of the Tramways Committee, and Councillor J. W. Crowther, ex-chairman of the Electric Supply Committee, commended the undertaking, and Councillor A. J. Bailey, as leader of many of the men transferred, placed on record the fact that cheap electric power had not been produced at the expense of the workmen. The relationship between them and the staff had been most cordial

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Mr. H. E. Yerbury, electrical engineer, acknowledged the compliments to the staff. Mr. A. R. Fearnley, general manager of the tramways, and Mr. S. E. Fedden, general manager of the electric supply, took part in the proceedings.

MISCELLANEOUS NEWS AND NOTES.

P-a-y-e Cars at Blackpool.—The pay-as-you-enter system is to be adopted at Blackpool for top deck passengers.

Light Railway Order.—The Board of Trade have confirmed the York Corporation Light Railways (Extensions) Order, 1914.

Association of Railway Companies' Signal Superintendents and Signal Engineers.—The forty-ninth conference of this Association will be held at the Railway Clearing House on Tuesday, October 13.

A Nottingham Extension.—A new tramway service in Nottingham was opened for traffic on September 25. It extends from the Market Place to Gregory Street, Derby Road, and the journey occupies about a quarter of an hour.

Recruiting Car at Croydon.—We have received from the tramways manager, Mr. T. B. Goodyer, a photograph of a rail water car decorated with a view to assisting recruiting. At night the car is illuminated with over 150 32-c.p. lamps, and has attracted much attention.

Electric Tramway Concessions.—Tenders are invited by the Ministerio de Fomento, Madrid, until noon on October 19, for a concession for the construction and working of an electric tramway in the town of San Sebastian. An option is held by the Cia del Tranvia de San Sebastian.

Trackless Trolley Cars in South Africa.—Transvaal newspapers just to hand contain reports of the opening of a trackless trolley route on the Cedes system at Germiston. The inaugural ceremony was presided over by the Mayor (Mr. H. Henderson), and representatives of Bloemfontein, Pretoria and Johannesburg also attended.

Trouble in Alexandria.—A recent issue of the *Egyptian Gazette* gives particulars of some disturbances which have taken place in Alexandria, arising out of a large number of the natives being out of employment. Among the incidents was the throwing of stones at the Ramleh tramcars, some of the windows of which were broken, and a few passengers were injured.

A Cardiff Scheme.—The Cardiff city engineer has been instructed to prepare estimates of the cost of carrying out an extension of the tramways in the shape of a single line from the present terminus in Whitchurch Road to Gabalfa, and also an extension in Cathedral Road to Llandaff Fields. The Tramways Committee will decide definitely on the question after receiving the estimates.

W. A. Stevens, Limited, inform us that a large number of the Tilling-Stevens petrol electric vehicles are now passing through the works at Maidstone. Amongst the latest orders to be put in hand are machines of various types for the following public services:—Falkirk and District Tramway Company, London Fire Brigade, Worthing Motor Services, Limited, and Messrs. J. Chapman and Sons, Eastbourne.

A Patriotic Firm.—Speaking at the annual meeting of Bolckow, Vaughan and Company in Manchester on Wednesday, Sir J. E. Johnson-Ferguson said that Mr. R. D. Kitson, Leeds, one of the directors, and Mr. Darwin, the secretary, had joined their regiments for military duty, and near the company's works a military hospital had been completely equipped and had been accepted by the War Office. The number of the company's employees now serving in the Army was 2,033, and the allowances which the company made to these men and their dependents amounted to £1,233 per week.

Workmen's Fares in Rochdale.—The Tramways Committee have decided to extend the time for the use of workmen's tickets in the morning from 7.30 to 8.30, and to allow the return journey to be made at any hour in the evening and up to 3 o'clock on Saturday afternoons. It was also decided that the special workmen's cars in the evening be abolished with the exception of one car in each section. The effect of this will be that a workman who has not taken a return ticket in the morning will be required to pay the ordinary fare in the evening, unless he travels by the one particular car allotted.

Railless Traction at Hove.—Members of Brighton Town Council have been given an opportunity of riding on the new railless cars which have just been provided by the Hove local authority in their district. As the result of several trips it was found that the running was smooth, that there was entire absence of jolting in starting and stopping, and that the vehicle was well under control. The visitors directed attention specially to the over-running trolley, as it is the under-running type which has been adopted for Brighton. The two systems are to be considered further by the Brighton Tramways Committee.

A Newcastle Proposal.—At a meeting of Newcastle Tramways Committee on September 24 it was decided to recommend the Corporation to carry out the undertaking given to the Committee of the House of Lords when the North Eastern Railway Company's Bill was under consideration that the Corporation would next session seek Parliamentary powers for through running between Newcastle and Gateshead. Last session the railway company sought authority from Parliament to run omnibuses over the high level bridge, and this was successfully opposed by the Corporation. It was at that time intimated that the City Council would seek to obtain powers to connect the Newcastle and Gateshead tramway system by way of the bridge. The Committee also agreed that the chairman and vice-chairman should interview Sir A. Kaye Butterworth, general manager of the North Eastern Railway Company, with the object of trying to come to an amicable arrangement.

Competition with German Trade in Neutral Markets.—The Commercial Intelligence Branch of the Board of Trade on Thursday issued a long statement to traders and others setting out the commercial and financial conditions and openings for British trade in Australia, South Africa, Canada, Ceylon, Sierre Leone, Trinidad, Jamaica, British Guiana, Portuguese East Africa, France and Brazil. The statement has been prepared in connection with the scheme which the Board of Trade have initiated for assisting British manufacturers and traders to take advantage of the opportunity afforded by the War for securing trade formerly in the hands of German and Austrian rivals. Further details in regard to trade with the countries mentioned may be inspected at the Commercial Intelligence Branch of the Board of Trade, 73, Basinghall Street, London, E.C., by United Kingdom manufacturers and traders.

CONTRACTS AND ORDERS.

The Edison Accumulators, Limited, have received an order from the Belfast Tramways and Electricity Committee for an electric motor tower wagon.

The Crown Agents for the Colonies have recently accepted the following among other tenders:—Mather and Platt, train lighting dynamos; Electric Construction Company, electric apparatus; R. Hudson and Company, tramway spares.

Walthamstow Urban District Council are recommended to accept the following tenders:—Walter Scott, Limited, steel rails (Sandberg) fishplates, etc.; Edgar Allen and Company, castings; Bayliss, Jones and Bayliss, fish-bolts, rivets and tie-bars; Watlington and Company, copper bonds.

The General Electric Company have an order from Southwark Borough Council for 45,000 pairs of arc lamp carbons required during the next twelve months at £8 7s. 10d. and £9 12s. 2d. per thousand. The same company have an order from the Southwark Council for 20 Angold magazine flame lamps at £9 10s. each.

The Peckham Truck and Engineering Company, Limited, of Queen Anne's Chambers, Westminster, have received the following orders through the Brush Electrical Engineering Company, Limited:—Wallasey Corporation, six P-22 pendulum trucks fitted with "Thomas" automatic brake adjusters; Doncaster Corporation, four P-22 pendulum trucks fitted with "Thomas" automatic brake adjusters; Darwen Corporation, two pairs of P-25 pendulum gear maximum traction trucks; Southend-on-Sea Corporation, three P-22 pendulum geared trucks and three P-25 pendulum geared maximum traction trucks; Huddersfield Corporation, one P-22 pendulum geared truck; Colne Corporation, one set R-24 radial gears; Blackpool Corporation, one set pendulum gears and one set radial gears. The company have also received an order from Christchurch Tramway Board of New Zealand for two radial trucks.

PERSONAL.

Mr. H. Bell, electrical engineer and manager of the Hull Corporation electricity works, is on active service.

Alderman W. Thompson, chairman of the Blackburn electricity and tramways committee, has accepted nomination as mayor for the forthcoming year.

Sir Robert Turnbull, general manager of the London and North Western Railway, retired from that position on October 1, and has been succeeded by Mr. Guy Calthrop, who was selected by the directors last year to fill the position.

FINANCIAL REPORTS AND MEETINGS.

Kalgoorlie Electric Power and Lighting Corporation.—A dividend on the preference shares at the rate of 4 per cent. per annum for the six months ended September 30 has been declared.

La Plata Electric Tramways.—The accounts for the half-year ended June 30 last show a surplus of £5,212 after providing for debenture interest. The board have decided not to pay an interim dividend on the preference shares.

Val de Travers Asphalte Paving Company.—The directors have declared an interim dividend of 6d. per share for the half-year ended June 30, being at the rate of 5 per cent. per annum. This is the same rate as was paid a year ago.

Parana Tramways Company, Limited, was registered on September 24 with a capital of £75,000 in £1 shares, with the object of acquiring and working tramways and railways, or to purchase and supply electricity for lighting, heating, motor power and traction, and to enter into an agreement with J. G. White and Company, Limited. The solicitors are Messrs. Julius, Edwards and Thomas, of 8, Old Jewry, E.C.

Hurst, Nelson and Co.—The directors have had before them the draft accounts for the year ended July 18, and, subject to completion of the audit, the results are such as will enable the board, after setting aside the amounts required for the dividend on the preference shares payable in November and May next, and placing a substantial sum to reserve, to recommend a dividend of 5 per cent. on the ordinary shares. A year ago 2½ per cent. was paid on the ordinary shares.

Wellington (N.Z.) Tramways.—The annual report of Wellington (New Zealand) Corporation tramways for the year ended March 31 last, a copy of which has just reached us, shows that the total revenue was £160,347, being an increase of £8,508 compared with

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the previous year. The working expenses were £105,613, an increase of £4,484. After paying interest, sinking fund, and allowance of £14,682 for depreciation, there remained a net surplus of £15,430, being an increase of £3,527. The percentage of working expenses to total revenue was 65.86 compared with 66.6, and the ratio of net surplus to capital outlay was 2.45 per cent. against 1.96 per cent. The total revenue per car mile was 16.52d. against 15.81d. in the previous year, while the working expenses per car mile were 10.88d. against 10.53d. The capital charges per car mile were 4.05d., so that the total expenses were 14.93d. The number of passengers was 24,565,376, being an increase of 706,964. The arrangement of fares seems to be an interesting one as the average fares per mile are given as follow:—Ordinary cash fares, .89d.; concession tickets, .6d.; workers' tickets, .44d.; scholars' tickets, .19d. In view of increasing traffic various extensions of the lines are proposed.

Halifax Tramways.—The annual report of the Corporation tramways, of which Mr. Jas. D. Caird is traffic manager and Mr. J. W. Galloway, tramways engineer, for the year ended March 31, 1914, shows that the results reached in the previous year have been well maintained. There has been an increase of about £3,700 in traffic revenue, but working expenses have also increased, so that the gross profit is practically the same. The net profit, however, shows an increase of £962. The particulars are as follows:—

	Total.		Per car mile.	
	1913-14	1912-13	1913-14	1912-13
Income—	£	£		
Passengers	106,180	102,578	11.37	11.44
Luggage, mail bags and parcels ..	2,437	2,369	.26	.26
Advertising on cars, etc. ..	1,033	1,026	.11	.12
Total revenue	109,650	105,973	11.74	11.82
Working expenses	73,273	69,661	7.84	7.77
Gross profit	36,377	36,312	3.90	4.05
From this has to be deducted—				
Special & Parliamentary charges	829	2,961	.09	.33
Net interest	10,288	10,108	1.10	1.13
Contribution to sinking fund ..	11,617	10,562	1.25	1.18
	22,734	23,631	2.44	2.64
Net profit	13,643	12,681	1.46	1.41

The gross capital expenditure stands at £419,335. The total track length amounts to 55½ miles and the rolling stock consists of 101 cars, of which an average of 77 cars are in use daily. The average energy consumption per car mile was 1.94 units per car mile, an increase of .13, and the cost per unit was 1½d.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return.		Aggregate		
		1912-3.	1913-4.	Wks.	1913-4.	Increase or Dec.
Anglo-Argentine	Sept. 23	£56,344	£49,013	38	£2,069,290	— £31,400
Auckland..... (28 days)	July 31	18,960	20,782	4⅕	23,311	+ 1,244
Ballarat and Bendigo	July 19	3,219	2,987	16	14,227	— 137
Brazilian St. Ely. Mlrs.	May	44,890	50,237	43	523,872	+ 76,626
Brazilian Traction	July 25	95,720	97,183	4	388,200	+ 8,334
Brisbane	August	29,970	33,172	5	231,897	+ 24,649
British Columbia ....$	July	755,943	690,023	4	690,023	+ 65,920
Buenos Aires Pt. & City	June	6,791	6,738	26	43,250	+ 3,143
Buenos Aires Lacross...	July	45,221	43,327	4	43,327	— 1,894
Calcutta.....Rs.	Sept. 26	70,896	66,575	38	26,21,357	+ 1,04,075
Cape Town	June	11,560	12,742	52	155,466	+ 18,249
Carthagena & Herrerias	August	2,192	2,758	35	18,970	— 4,347
Cordoba.....	July	13,629	14,256	17	56,238	+ 2,542
East India	August	2,005	2,112	4	2,112	+ 107
Kalgoorlie	June	2,854	2,692	26	15,522	— 1,704
La Plata	July	4,770	4,359	30	33,608	— 2,789
Lima	August	33,939	29,800	35	271,607	+ 5,102
Lisbon ..... Mlrs.	July	164,715	171,179	31	1,143,064	+ 45,838
Madras (14 days) Rs.	Aug. 31	28,084	29,529	33	4,65,638	+ 35,433
Manila	June	133,500	132,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	387,500	+ 7,000
Mexico .....$	August	635,445	687,593	35	4,846,344	+ 334,757
Montevideo	August	28,829	26,075	43	209,738	— 6,698
Para	August	24,435	19,354	39	189,946	— 38,540
Port Elizabeth	June	3,288	3,312	52	44,931	+ 1,901
Puebla .. .. $	July	56,700	61,000	31	451,800	+ 20,100
Rangoon	August	4,639	4,629	35	41,988	+ 1,356
Shanghai .....$	July 29	31,163	24,600	30	720,340	+ 94,215
Singapore .....$	Aug. 15	12,790	10,360	32	389,618	+ 1,269
Toronto .....$	July	811,966	866,291	31	5,892,147	+ 424,695
Winnipeg..... .....$	July	336,821	346,630	31	2,488,182	+ 128,967

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return.			Aggregate.		
		1913.	1914.	Incr. or Dec.	Wks.	1913-4.	Increase or Dec.
Aberdeen Corporation..	Sept. 23	£1,700	£1,508	— £192	17	£29,864	+ £554
Accrington Corp.....	,, 23	571	509	— 62	25	14,634	— 6
Ayr Corporation	,, 26	331	284	— 47	19	9,148	— 729
Bath Electric	,, 23	1,113	1,059	— 54	38	38,097	+ 561
Birkenhead Corp.	,, 27	1,450	1,258	— 192	25½	33,220	— 796
Birmingham Corp.	,, 26	13,094	11,685	— 1,409	26	315,384	+ 16,052
Blackburn Corporation	,, 23	1,421	1,407	— 14	26	36,112	+ 1,250
Blackpool Corporation	,, 24	2,589	1,808	— 781	26	56,759	— 8,168
Bolton Corporation.....	,, 27	2,801	2,521	— 280	26	73,633	+ 1,765
Bournemouth Corp.....	,, 30	2,203	1,864	— 339	26	58,178	— 2,855
Bradford Corporation..	,, 26	5,995	5,725	— 270	26	164,621	+ 8,378
Brighton Corporation..	,, 27	1,272	1,160	— 112	25½	31,951	+ 8
Bristol	,, 25	8,497	8,326	— 171	38½	333,369	+ 19,829
British Elec. Federatn.	,, 18	53,760	49,637	*	...	...	...
Burnley Corporation ..	,, 26	1,791	1,352	— 439	26	42,306	— 2,661
Burton-on-Trent Corp.	,, 27	304	285	— 19	26	7,965	+ 296
Bury Corporation.....	,, 27	1,462	1,319	— 143	25½	37,613	+ 1,683
Cardiff Corporation.....	,, 19	2,711	2,710	— 1	24	71,575	+ 1,954
Chatham and District..	,, 24	1,020	1,040	+ 20	38	36,331	+ 741
Chesterfield Corp.	,, 24	258	241	— 17	24	7,158	+ 470
Colne Corporation	,, 26	298	204	— 94	...	...	...
Cork Electric.....	,, 24	530	489	— 41	38	19,344	+ 55
Croydon Corporation ..	,, 18	1,715	1,575	— 140	24	44,125	+ 2,584
Darlington Corporation	,, 26	268	262	— 6	26	7,024	+ 486
Derby Corporation	,, 26	1,065	943	— 122	25½	27,004	+ 963
Dover Corporation	,, 26	288	261	— 27	26	6,889	— 188
Dublin & Lucan	,, 25	119	150	+ 31	12½	2,063	— 108
Dublin United	,, 25	3,310	5,662	+ 2,352	38	236,378	+ 6,484
Dundee City	,, 30	1,379	1,284	— 95	19½	26,221	— 188
East Ham Corporation	,, 26	984	1,158	+ 174	25½	29,144	+ 3,475
Exeter Corporation	,, 25	366	343	— 23	26	9,685	+ 248
Gearless Motor 'Buses.	,, 19	605	502	— 103	38	18,019	+ 6,575
Glasgow Corporation ..	,, 26	21,110	19,683	— 1,427	16	342,791	+ 7,875
Glossop (U. Elec. Supply)	,, 26	136	112	— 24	39	4,900	— 173
Halifax Corporation ...	,, 22	2,180	2,091	— 89	25	58,416	+ 3,040
Hastings & District.....	,, 23	1,275	1,002	— 273	38	40,376	— 2,328
Huddersfield Corp.	,, 26	2,328	2,413	+ 85	26	61,756	+ 6,066
Hull Corporation	,, 26	3,201	2,945	— 256	26	80,798	+ 351
Ilford U.D.C.	,, 26	457	561	+ 104	25	14,653	+ 2,825
Ilkeston Corporation ...	,, 30	147	125	— 22	26	3,513	— 96
Ipswich Corporation ..	,, 26	535	429	— 106	26	12,790	+ 104
Isle of Thanet	,, 26	981	735	— 246	51	33,422	— 3,215
Kilmarnock Corp.	,, 26	171	147	— 24	19	3,293	— 239
Lanarkshire	,, 24	1,834	1,776	— 58	38	72,284	+ 8,160
Lancashire United	,, 23	1,662	1,616	— 46	38	63,873	+ 4,667
Leeds City	,, 26	8,566	7,677	— 889	26	47,882	+ 2,678
Leicester Corporation..	,, 26	3,136	2,651	— 485	39	111,448	+ 8,333
Leith Corporation	,, 26	767	683	— 84	19	14,594	+ 322
Leyton U.D.C.	,, 24	1,397	1,265	— 132	24	34,914	+ 1,771
Liverpool Corporation..	,, 26	13,554	12,916	— 638	38½	510,873	+ 12,621
Llandudno & Colwyn B.	,, 25	374	328	— 46	43	13,974	— 1,251
London County Council	,, 23	43,208	41,976	— 1,232	25	1,106,334	+ 50,009
London Gnl. Omnibus..	Aug. 1	68,575	71,625	+ 3,050	31	1,982,031	+ 64,392
London United	Sept. 19	6,705	5,572	— 1,133	37	236,808	— 2 559
Lowestoft Corporation	,, 26	243	192	— 51	51	11,252	— 16
Maidstone Corporation	,, 24	231	226	— 5	26	5,758	— 297
Manchester Corp.....	,, 26	18,871	16,582	— 2,289	26	454,581	+ 230
Met. Elec. Trys.	,, 18	9,468	8,176	— 1,292	35	345,052	+ 4,025
Nat. Steam Car Co., Ld.	,, 21	3,695	4,183	+ 488	46	199,858	+ 73,723
Nelson Corporation.....	,, 26	238	148	— 90	25½	5,268	— 881
N'castle-on-Tyne Corp.	,, 26	5,158	5,646	+ 488	26	139,288	+ 14,237
Newport (Mon.) Corp....	,, 19	830	817	+ 18	25	21,277	+ 2,061
New St. Helens & Dist..	,, 23	816	992	+ 176	19	12,274	+ 790
Northampton Corp	,, 25	800	595	— 205	25½	15,407	— 2
Nottingham Corp.	,, 24	3,406	3,130	— 276	25½	88,135	+ 2,796
Oldham Corporation ..	,, 27	2,401	2,039	— 362	27	61,880	+ 1,975
Portsmouth Corp.....	,, 26	2,478	2,277	— 201	26	66,801	...
Preston Corporation ...	,, 23	872	958	+ 86	26	24,362	+ 1,093
Provincial	,, 26	2,137	2,103	— 34	51	101,509	+ 1,726
Reading Corporation ...	,, 25	741	650	— 91	25	18,737	+ 761
Rhondda.....	,, 24	1,310	1,222	— 88	38	47,522	+ 1,856
Rochdale Corporation	,, 26	1,665	1,465	— 200	26	44,122	+ 1,588
Rotherham Corp.....	,, 30	1,062	1,151	+ 89	26	27,323	+ 1,191
Salford Corporation ...	,, 28	5,506	4,869	— 667	25	133,686	— 3,290
Sheffield Corporation...	,, 27	7,800	7,660	— 140	26½	206,708	+ 7,136
Southampton Corp.....	,, 23	1,489	1,209	— 280	25	35,728	+ 706
Southend-on-Sea Corp.	,, 23	1,066	968	— 118	26	30,826	+ 2,706
South Met. Trys.	,, 18	1,228	1,071	— 157	38	42,045	+ 6,049
South Shields Corp.....	,, 26	749	696	— 53	25½	20,788	+ 1,620
Sunderland Corp.....	,, 27	1,559	1,378	— 181	26	40,091	+ 1,342
Sunderland District ...	,, 23	552	509	— 43	47	27,468	+ 1,567
Swindon Corporation ...	,, 23	183	179	— 4	25	4,654	+ 346
Torquay.....	,, 24	748	532	— 216	38	23,678	— 3,112
Trys. (M.E.T.) 'Buses	,, 19	8,928	5,256	— 3,672	38	336,230	+ 183,768
TynesideTrys. & Tmrds	,, 23	517	716	+ 199	13	8,107	+ 1,163
Wallasey Corporation	,, 26	1,236	1,178	— 58	25½	35,121	+ 1,721
Walsall Corporation ..	,, 26	663	605	— 58	32	24,334	+ 307
Walthamstow U.D.C...	,, 26	797	738	— 59	26	22,090	+ 2,227
Warrington Corp	,, 24	455	426	— 29	25	11,300	— 149
West Ham Corporation	,, 24	2,783	2,664	— 119	25	72,983	+ 3,247
Wigan Corporation	,, 17	1,461	1,385	— 76	24	36,288	+ 23
Wolverhampton Corp	,, 30	1,187	1,022	— 165	27	28,418	— 310
Yorkshire (W. Riding)	,, 27	1,654	1,361	— 293	39	56,950	+ 263

* From such of the services as were working both last year and this year the receipts show a decrease of £4,069 upon the week.

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THE Tramway & Railway World
WITH MOTOR TRAFFIC SECTION

FOUNDED 1892. LONDON, OCTOBER 8, 1914. VOL. XXXVI.

ADAPTABILITY OF THE ELECTRIC LOCOMOTIVE TO SHUNTING SERVICE.

Approximately 8,000,000 people are served by the New York, New Haven, and Hartford Railroad, whose main line extends from New York City into the New England States, and by which fully 75 per cent. of all railway goods traffic in and out of New England is handled. The bulk of this traffic is carried *via* the Harlem River Division and the Harlem River and Westchester freight and transfer yards. Although the complete electrification of the New Haven road between New York and New Haven has not yet been placed in operation, the shunting of all goods cars between Stamford and Harlem River has been done successfully by electricity for approximately 20 months. The economies obtained by the use of the electric shunting locomotives have exceeded all the expectations of those who are responsible for their application to this field.

The reliability of this shunting locomotive equipment has proved to be far superior to that of the steam locomotive in shunting service, and its working is a source of gratification to the operating department and trainmen who have this work in charge.

The three main shunting yards on the New Haven system are: Harlem River Yard, length, 23·3 miles; Oak Point Yard, length, 37·16 miles; and Westchester Yard, length, 22·29 miles. There are also the Van Nest Yards, which are used for storage only.

The first shunting engine was placed in operation at Stamford, Connecticut, in March, 1911. This was followed in August, 1912, by a similar locomotive in the Westchester Yards; then in September, 1912, the first machine began work in Oak Point Yards in float service; and in August, 1913, the Harlem River Yards proper received their first electric shunting locomotive.

Electric Shunting Locomotives at Work in Oak Point Yard.

Up to the present time not a single feature has developed in which the electric locomotive is not superior to the steam locomotive in shunting service. The ease with which electric locomotives are controlled, the elimination of stand-by losses and those that are necessary where coal and water are used, elimination of liability of freezing up in cold weather, are all features which are to be credited to the electric locomotive. All the heavy freight tonnage mentioned

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above is handled within the corporate limits of New York City, and the elimination of smoke by the use of the electric locomotive is another advantage.

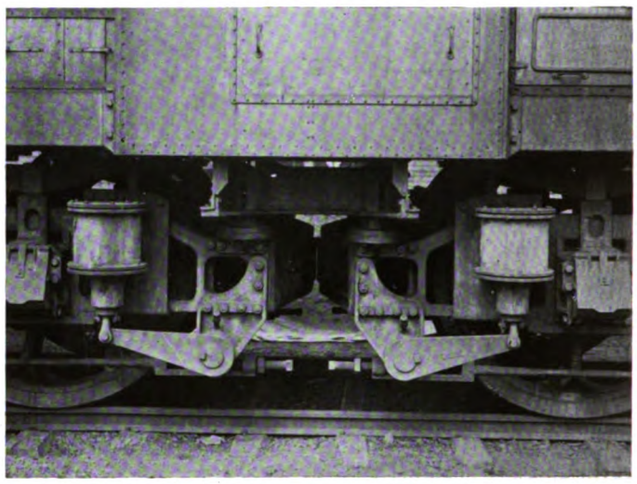
Six single-phase electric locomotives do the work of approximately twice the number of steam locomotives formerly used. A total of eight of these electric locomotives are sufficient for practically all of the shunting work between Stamford and Harlem River Station. These are kept in service 24 hours a day, each making on the average approximately 140 miles in 24 hours, with three eight-hour crew shifts. The electric locomotives handling the work between Westchester Yard and Harlem River for a given month made 38,000 locomotive-miles, and consumed approximately 896,000 kilowatt-hours of electrical energy at the locomotive. During this same period, the six locomotives handled approximately 65,000 cars, which had a total weight of approximately one million tons.

There are 16 shunting locomotives included in this installation. Each locomotive is equipped with four Westinghouse No. 410, 125 H.P., 25-cycle, single-phase motors and unit switch control. These locomotives each weigh 80 tons, and are able to exert a maximum tractive effort of 40,000 lb. with a clean dry rail. Particulars of hauling capacity, weights, and mechanical data are as follows:

RATED HAULING CAPACITY.

Track Profile.	Number of Cars each Weighing 45 Tons with Load.	Maximum Speed. Miles per Hour.
Straight level track ..	67	8·5
½ per cent. grade	28	8·1
1 per cent. grade	17	8·1
2 per cent. grade	9	8·1

The figures given for "straight level track" show the load which may be handled in infrequent switching service. The switching locomotives are guaranteed to exert a maximum tractive effort of 36,000 lb. for about three minutes at speeds up to six miles per hour, and a continuous tractive effort of 14,800 lb. at a speed of 11½ miles per hour. In practice it has been found that an electric switching locomotive can do the work of two steam locomotives, because it can be operated both day and night. In fact, the first switching locomotive furnished has been in use for about 20 hours a day in the yards



Connection between Trucks.

at Stamford. It is not expected that the maximum voltage on the motors will be reached in ordinary switching service, but it is available when climbing grades or on longer runs in the yard. The average operating potential is estimated to be 190 volts. The hour rating corresponding to this voltage and current of 900 amperes is approximately 125 H.P. per motor.

80-Ton Single-Phase Electric Shunting Locomotive with Pantagraph Trolley.

Arrangements have been made for a large bridge, known as the interconnecting railroad bridge, between Harlem River and Long Island City, which will connect the Pennsylvania and New Haven systems. Electric motive power will be used entirely for handling all traffic over this bridge.

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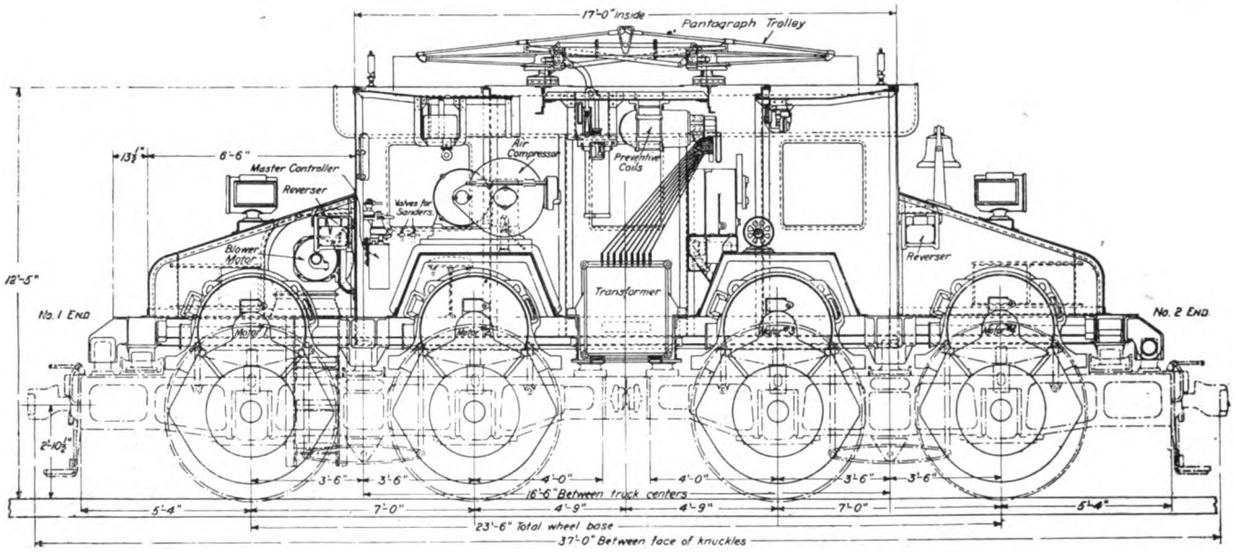
Mechanical Features.

These shunting locomotives, as will be seen from the drawing below, are of the eight-wheeled 0-4-4-0 articulated truck type, with central cab and sloping ends. The pulling and buffing strains are taken by the truck frames, which are joined at the centre of the locomotive by a draw bar. The frames are placed outside the wheels, and are steel castings of the usual bar type, having straight pedestal and removable gibs. The semi-elliptic springs are placed directly over the journal boxes, and the springs of each truck are connected by equalising beams. There is no cross equalisation with this arrangement; that is, the equaliser system of one side of the locomotive is not connected with that of the other side. The end buffers are of cast steel, arranged for Westinghouse friction draft gear. At their inner ends the frames are braced transversely by steel castings, and these are provided with pockets which carry the intermediate draw bar. Some of the principal features of these electric shunting locomotives are as follows:

Weights.	lbs.
Per driver axle	39,780
Mechanical parts	83,390
Transformer	6,000
Motor complete with gear and gear case and quill drive	13,585
Control equipment and details	10,675
Forced ventilating equipment	770
Air brake equipment	3,950
Total weight	159,120



Longitudinal Section of Electric Shunting Locomotive.

Mechanical Data.	ft.	ins.
Type of trucks—4-wheels, articulated and swivelled.		
Truck wheel base, rigid	7	0
Total wheel base	23	6
Length between coupler knuckles	37	0
Length of cab inside	17	0
Length of hoods	6	6
Width of hoods	5	0
Width over all	10	3
Diameter driving wheel	5	3
Total height over cab roof	12	6
Gauge	4	8½

Each end of the armature shaft is equipped with a pinion which meshes with a steel-tired gear. These gears are mounted rigidly in a quill which surrounds the axle with a clearance sufficient to allow vertical wheel play. The quill is carried in journals formed in the motor frame. The motor tractive effort is transmitted from the gears to the wheels through helical springs, rigidly attached at their ends to the wheel centre and gear centre respectively. With this arrangement, the motors are spring supported, and the centre of gravity of the locomotive is at a suitable height above the rail.

As these locomotives operate on the New Haven tracks only; no provision has been made for collecting current from a third rail. The locomotives have been designed to traverse 20 degree curves.

The frame which carries the superstructure of the locomotive is built up of rolled shapes and plates with the exception of the cab bolsters, which are cast steel. It is supported on each truck frame by spring-loaded friction plates at four points; two of these points are located at the inner end of the frame, one on either side, as far from the longitudinal centre line as possible. The two remaining points are situated at the outer end of the frame, and placed close together on either side of the longitudinal centre line. The trucks have centre pins also, but these carry no weight and are simply to keep the superstructure frame in proper alignment with the trucks. One of the centre pins is given sufficient longitudinal play to compensate for the backlash existing between pulling and buffing positions. The main driving wheels are 63 in. in diameter and have 56-in. cast-steel spoke centres. The tires are held with a shrink fit and shoulder.

The cab, which is of the steeple type, is built of steel plates, with the main portion 17 ft. 8 in. long. An operating equipment is placed at each end. Part of the apparatus is hung from the roof. Access can easily be had to transformer, compressor, and other control apparatus. The end motors, which are placed under the sloping hoods, can be handled by a crane after removing the hoods. All the motors can be dropped into an overhauling pit. This locomotive is fitted with Westinghouse double-end brake equipment with train connections; a hand brake on one track, sand boxes at each end with air sanders, and air-operated bell and whistle. Steps are secured to each number. The cab can also be entered by means of a ladder on each side.

Electrical Equipment.

Motors and Blowers.—The No. 410 railway motor is of the series type with short-circuited compensating winding and preventive resistance leads to the armature circuit. The motor is designed with eight poles. The main field winding consists of concentrated field coils, each of which has a few turns of heavy copper strap, and is in its general construction very similar to the

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field coils used in large D.C. railway motors. The auxiliary or compensating winding is distributed in the slots provided in the pole pieces. It consists of heavy copper bars, one in each slot, and straps interconnecting these bars at the ends.

The armature winding consists of heavy copper strap, and the resistance leads in the armature are made of strap of high-resistance materials. It will be noted that windings are made of bars or straps, and are, therefore, of a very strong and reliable structure, a feature which is exceedingly desirable for railway work. This is combined with the fact that the compensating windings are practically eliminated, and the fact that the voltage of the motor is very low, far below the customary voltages on D.C. railway motors, makes this motor as reliable a structure as can be imagined in the present state of art.

Control.—The motors are connected in two pairs, so arranged that the two motors of each pair are permanently in series, while the two pairs are permanently in parallel. The speed regulation is obtained by connecting the motors to different taps on the secondary winding of the transformer in the same way as is done on all the previous New Haven locomotives. The control is exceedingly simple, because the switching locomotives are not required to operate on direct current. In addition to the alternating-current circuit breaker for shunting off the high-tension power from the transformer, the main circuit control apparatus consists merely of a single switch group having 12 unit switches together with three preventive coils and two reversers. As in all the previous locomotives, the switches are of the Westinghouse standard pneumatically-operated type, using the compressed air of the braking system as an operating force, and a small 20-volt storage battery for actuating the magnet valves. The battery is charged by means of a small motor-generator set which consists of a single-phase motor and direct-current generator. As a rule, this set furnishes all of the energy required for operating the controller circuits; the battery being merely allowed to float on the line ready for use in case of accident or other emergency.

These locomotives are controlled by means of master controllers situated in each side of the cab. A sixteenth locomotive has been built in which a single controller in the centre of the cab is provided for operation in either direction.

An ammeter is provided near each master controller to enable the engineer to know just what load each pair of motors is taking at any time, so that he can handle the locomotive to the best advantage. In the case of a switching locomotive it is especially desirable to know when it is capable of hauling extra heavy loads; in other words, to know the temperature condition of the motors. For this reason, a temperature indicator, which is built on the principle of the Wheatstone bridge, has been installed. The connection of this instrument is made through a coil in the motor fields. Its indications are obtained only when the motorman presses a button which is in the circuit of the control battery. This indicator has been in satisfactory operation since May, 1911. A novel feature in the main circuit connections is that the motors are operated from a two-coil transformer instead of an auto-transformer; thereby reducing the insulation strain on the windings to a minimum.

Brunswick-Coburg (Victoria) Tramways Trust.—A committee consisting of members of the Melbourne City Council and the Brunswick and Coburg Councils are considering a report on the projected tramways of the consulting engineer of the Brunswick-Coburg Tramways Trust. The estimated cost is £134,610. It is stated that tenders for most of the work will be called for this year.

A PICTURESQUE LIVERPOOL EXTENSION.

THE TRAMWAY AS A FEATURE IN TOWN PLANNING.

In planning the extension of the Edge Lane tramway to the Bowring Estate at Roby, the Liverpool Corporation have shown a resourcefulness and adaptability which provide a fine object lesson for future tramway builders and town planners. The electric tramway with overhead equipment has always been more or less of an offence to the æsthetic eye; but it has marched on its inexorable way from the sheer weight and momentum of its utilitarian advantages. So the æsthetic protest has been overborne by the tide of steel and copper, but it has never been quite reconciled. Here and there attempts have been made to modify the inherent ugliness of the system, but by far the boldest scheme of reconciliation is that just carried out by the Liverpool Corporation across its eastern frontier in the extension which we now describe.

It was, perhaps, inevitable that the tramway should take its tone and colour from the drab and dreary industrial surroundings which gave it birth, but no one cares to see a smiling country side smothered by such sombre hues, least of all in those quarters where the city man tries to find a place in the sun. Something of this kind must have been in the minds of the Liverpool Corporation when they planned their latest extension, for they have proved that a tramway can, chameleon-like, change its appearance according to its surroundings, instead of insisting on the neighbourhood adapting itself to the exigencies of the tramway system. The accompanying photographs, specially taken for THE TRAMWAY AND RAILWAY WORLD, show how this has been done, and how a tramway track can, by the exercise of a little ingenuity, be made to "fit into the picture." At the present stage the arrangements may appear a little rough and unfinished, but the illustrations indicate what this rural tramway will eventually become with its trim grass plots, neat privet hedges, and tree-planted footpaths.

Just two years ago the Edge Lane tramway was opened for public traffic. The present terminus is at the Tournament Hall, adjoining which the Liverpool Exhibition was held a year ago. A very considerable traffic has been developed on this route, and besides serving an extensive residential area, the tramway proved extremely useful in bringing visitors to the Exhibition and the Tournament Hall. The latter, by the way, was selected as the most suitable building in the Liverpool district for a mass meeting in connection with the present great recruiting campaign, and an assembly of over twelve thousand persons was addressed here on September 21, by Messrs. Winston Churchill, F. E. Smith, and T. P. O'Connor.

The extension now about to be inaugurated will afford tramway facilities for a growing suburb of the city, which, in some portions, is being rapidly developed by the installation of various manufactories, and, in others, by the development of building land and garden city colonies; whilst the terminal point of the extension will bring the growing districts of Broad Green, Roby, and Huyton into tramway communication with the centre of the city.

In 1906, Alderman Sir William Bowring, Bart., presented to the city his valuable property known as the "Bowring Estate," and it was opened for public use formally in 1907. This estate, which is finely situated on the main road between Liverpool and Warrington, consists of about 100 acres, well wooded and pleasantly undulating; and in addition to its various other attractions in the shape of gardens, shrubberies, etc., it contains a fine public golf course

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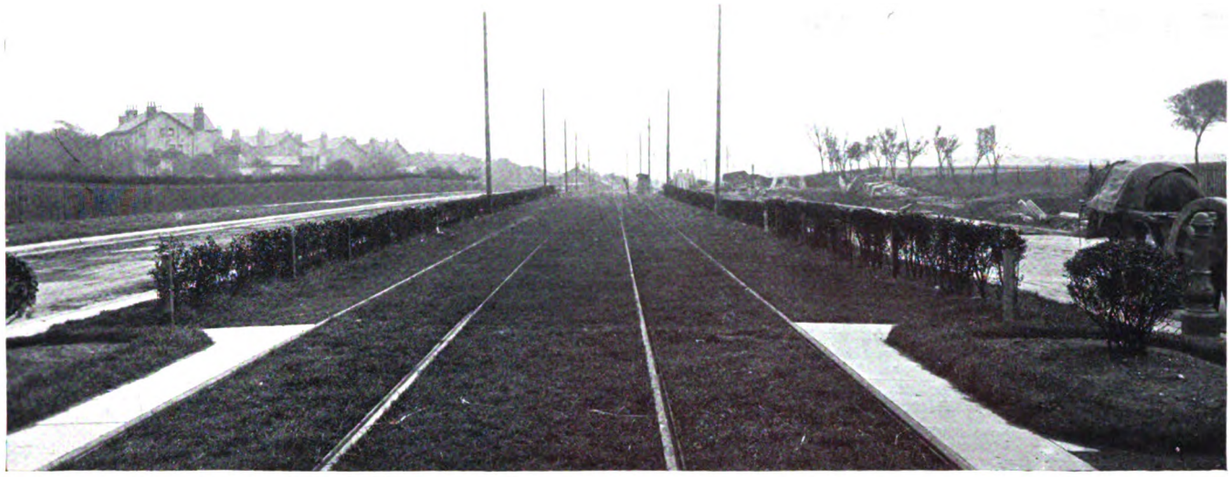

Fig. 1.—Track Laid in Grass—View from a Stopping Place.
(Sectional View of this Construction is shown in Fig. 6.)

Fig. 2.—The Enclosed Track near the New Terminus.

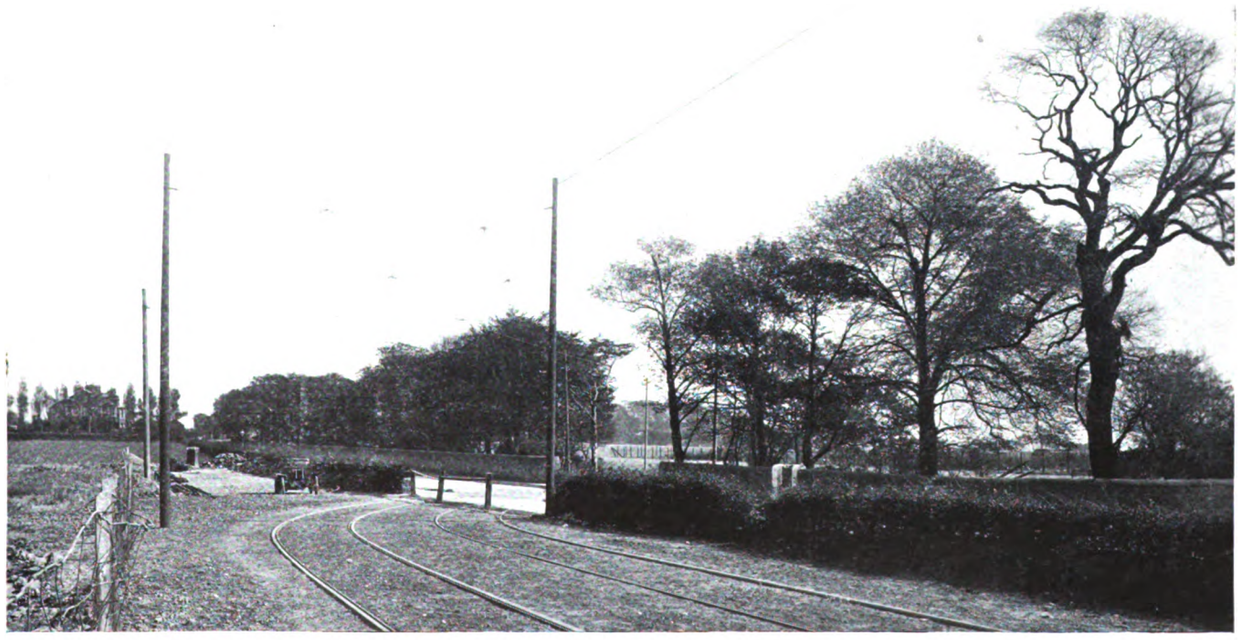

Fig. 3.—Crossing of Main Road where the Tramway Enters Bowring Estate.

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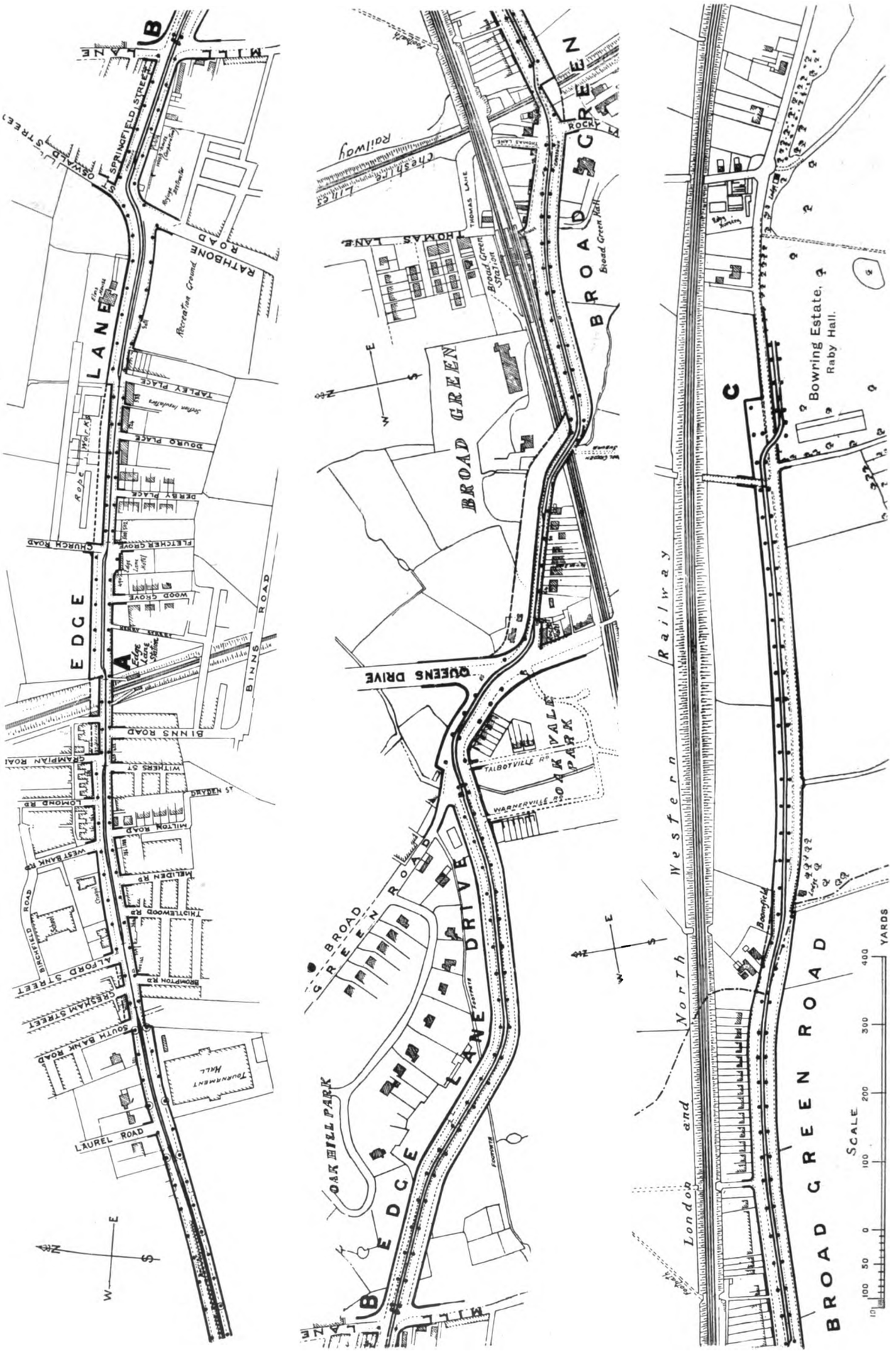

Fig. 4.—Plan of Tramway Extension to Bowring Estate, Liverpool.

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of nine holes, which is in growing demand by the citizens of Liverpool. The estate has a frontage of about half a mile on the main road, and is managed by the Bowring Estate Sub-Committee of the Corporation.

Following upon this presentation, the Corporation made an application to Parliament in 1909 for powers to lay a tramway to the estate, and this was authorised by the Liverpool Corporation Act, 1909. The first portion of this line, from its junction with the Wavertree route at Edge Hill, through Towerlands Street and Edge Lane to Southbank Road, a length of one mile 100 yards, was opened for public traffic on October 6, 1912. Since then the traffic to the Bowring estate has rapidly grown, with an increasing demand for a direct connection with the tramways of the city, and the complete extension has now been carried out to afford these additional facilities. All these lines are clearly shown on the inset map and plans (Fig. 4).

The line to be opened is about 2 miles 1,290 yards in length, double track throughout with the exception of some 600 yards; this will be doubled when the works necessary for widening the road have been completed. For a length of 1,450 yards at the city end the roadway will be 80 ft. wide with 10 ft. footpaths bordered by trees (Fig. 5, section A to B in Fig. 4), and for the remaining distance to the terminus a roadway of 120 ft. wide is provided (Fig. 6, section B to C in Fig. 4). On this latter section the tramway line, except where it crosses intersecting roads, has been laid in grass in the centre of the roadway, and the two lines are bordered by hedges. The width of this grass strip is 36 ft. Outside the tram tracks, on either side, are two parallel roadways for ordinary vehicular traffic, one 24 ft. wide and the other 18 ft. wide. Grass plots border these roadways, and outside of these plots are 6 ft. footpaths. The whole of the route is lined with trees and, wherever possible, the amenities of the well-wooded roadway have been preserved.

From the present terminus to the commencement of Edge Lane Drive at its junction with Mill Lane, the ordinary track construction generally adopted throughout the city has been preserved. This consists of solid Portland cement concrete foundation laid with standard rails, weighing 131 lb. per yard, and paved with granite or wood sets or tar macadam. Where the tracks have been laid in grass the construction is somewhat novel, the rails, weighing 92 lb. per yard, being laid on transverse wooden sleepers, 9 ft. long by 10 in. wide, by 5 in. deep, spaced 2 ft. apart. The cross sleepers are in turn laid on clinker ballast, which is brought up to the level of the top of the sleepers; over this soil is laid for grass, the top of the soil being left at the level of the bottom of the head of the rail. The gradients throughout are good, the steepest being 1 in 33, and the sharpest curve has a radius of 96 ft.

The overhead construction is throughout of the span-wire type, except at one or two points where single brackets with exceptionally long arms (Fig. 7) have been employed. The poles are British Standard section, steel taper poles, and the trolley wires are of 000 B. and S. gauge, ·409 in. diameter. Owing to the proximity of a large number of trunk telegraph and telephone wires, heavy guard wire construction has been necessitated throughout a large part of the line.

The standard cars used in Liverpool, including the double-staircase type illustrated in the TRAMWAY AND RAILWAY WORLD of April 4, 1912, and May 7, 1914, will be operated over this extension (Fig. 9). The fare for the through journey from the Pier Head to the Bowring Estate, a distance of six miles, will be 3d., with four intermediate 1d. stages.

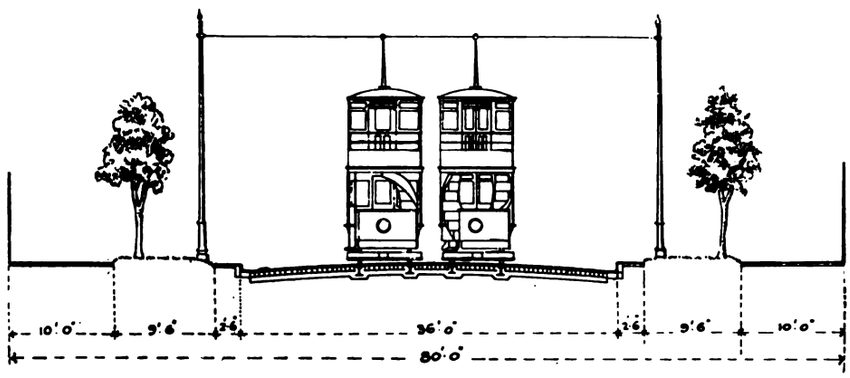

Fig. 5.—Cross Section A to B in Fig. 4.

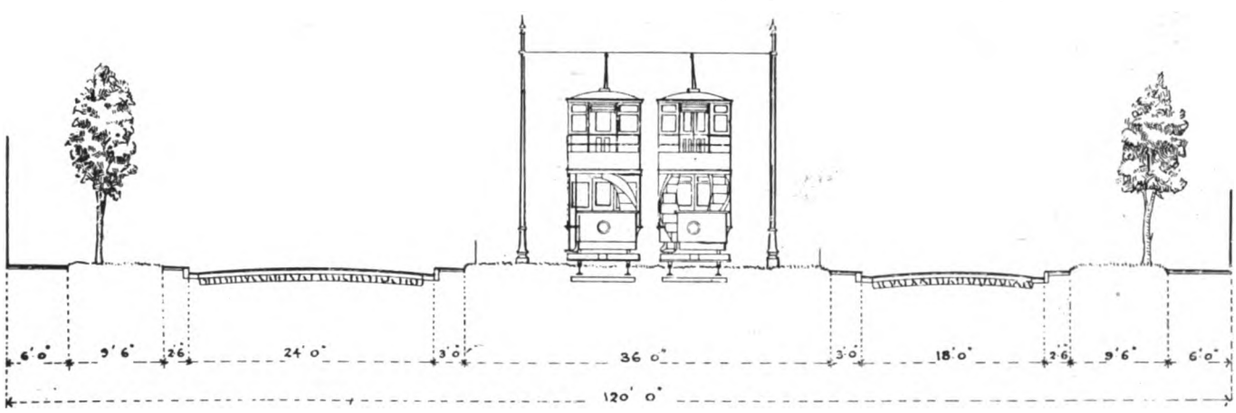

Fig. 6.—Cross Section B to C in Fig. 4.

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Owing to the tracks for this extension being largely constructed either on land fenced off from the public road altogether, or in the fenced centre of the new wide road, the Board of Trade have sanctioned a speed of 20 miles per hour where these conditions obtain, and it is hoped that when the road is completely widened throughout a very effective and quick service will be maintained with the city.

The track construction has been carried out under the supervision of the city engineer, Mr. John A. Brodie, M.Inst.C.E., and the overhead construction under the supervision of the tramways general manager, Mr. C. W. Mallins, A.I.E.E

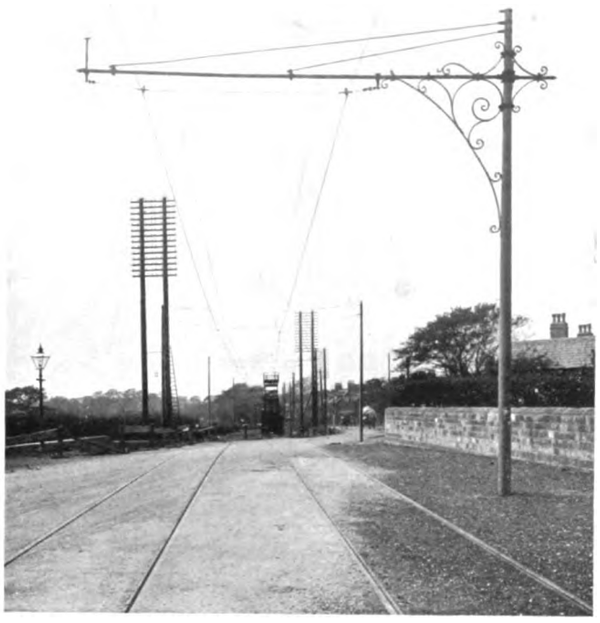

Fig. 7.—The only Departure from Span Wires.

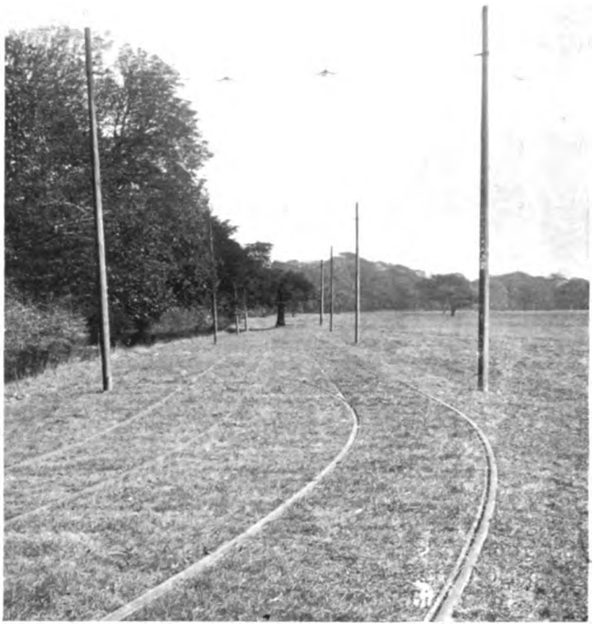

Fig. 8.—Terminus of Tramway on Bowring Estate.

Fig. 1 is a view of the track, taken from a stopping place and showing the general arrangement. The grass track is enclosed by a neat wire fencing screened by a privet hedge. Trees will be planted along the footpaths of the roads which are shown on each side of the track. Fig. 2 shows a section of the enclosed track near the new terminus. A natural hedge is seen on the left, the

Fig. 9.—Liverpool Canopy-Top Double-Staircase and Double-Entrance Car Used on New Extension.

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main road (bordered by telegraph poles) being just beyond this. On the right of the track, the wire fencing runs alongside a cornfield, and on the extreme right the London and North Western Railway (near Roby Station) is seen in embankment. Fig. 3 shows the tramway where it crosses over the main road into the Bowring Estate on the right. The enclosed space beyond the curve will be used as a siding. In Fig. 8 the tramway has entered the estate. The old tree at the end of the track marks the terminus and makes a picturesque "buffer-stop." Public traffic on this extension was opened on Sunday, September 27, as far as Broad Green Station.

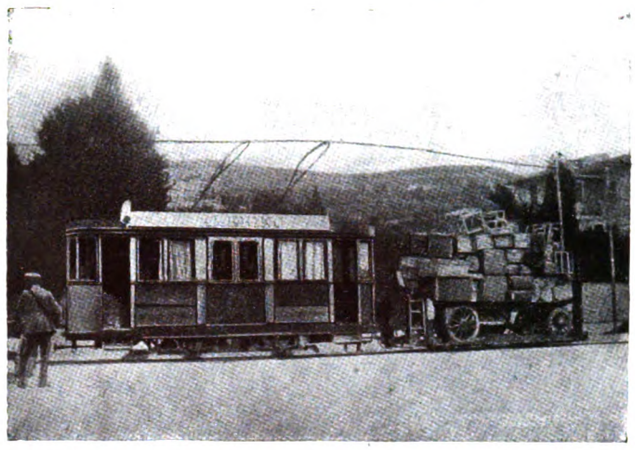
The cars for the extension will be supplied from the Green Lane (Old Swan) depôt, but the building of a car shed near the new terminus is now contemplated by the Corporation.

For the foregoing particulars, and for facilities to view the track prior to the opening, we are indebted to the courtesy of Mr. C. W. Mallins, general manager of the Liverpool Corporation Tramways.

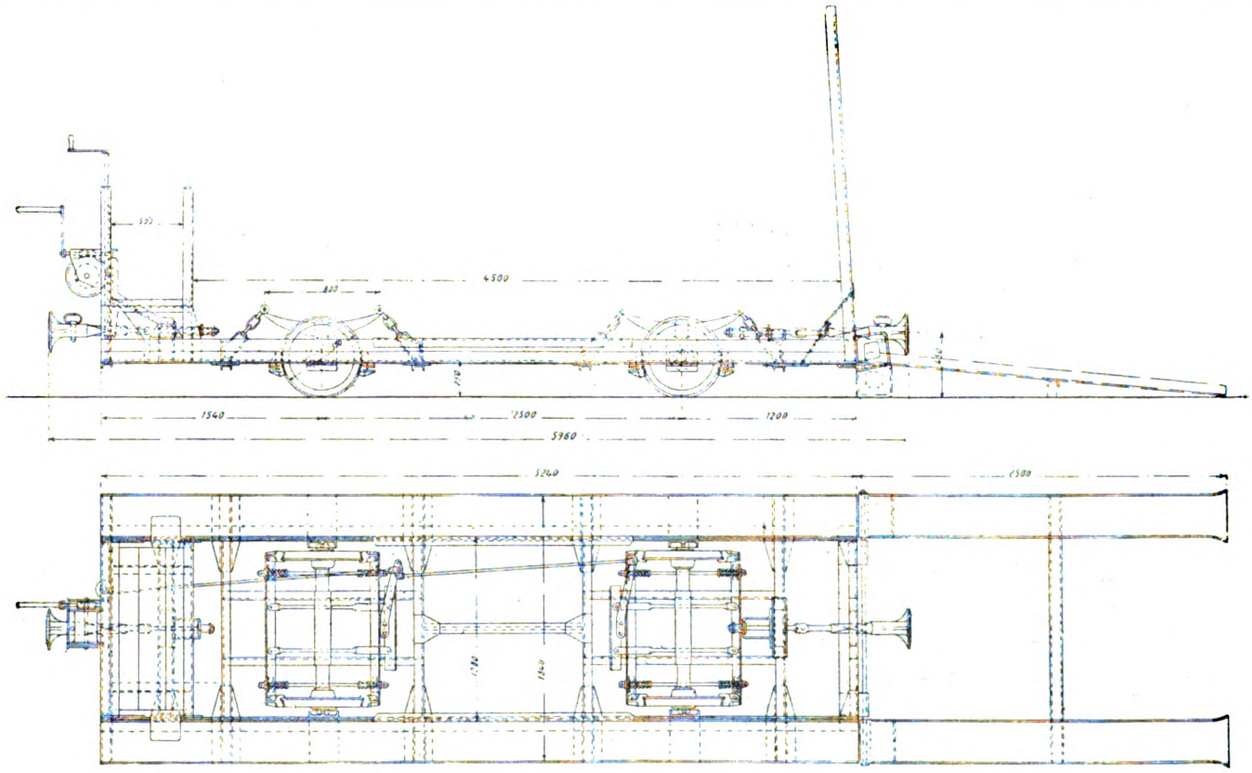
TRUCK FOR CARRYING ROAD VEHICLES ON TRAMWAYS.

The tramway which connects the town of Perugia with the railway station of that name is about 3 miles long, is on the metre gauge, with gradients up to 1 in 14, and with curves of 40 ft. radius. Since 1908 a regular service has been established whereby ordinary vehicles are carried over the tramways. The double transfer has been avoided by these means which would otherwise have had to take place if goods were carried between the station and the city on the tramway rolling stock. If this had had to be done the goods traffic would have been lost entirely to the tramway. Messrs. Arthur Koppel constructed a special car for the service, having a maximum carrying capacity of 5 tons. This truck is attached to a passenger car which has an adhesion of 12 tons and is equipped with two parallel series motors of 35 KW.

The Societá Umbra di Elettricità, which operates the tramway, has made over the service in question to a local company under an agreement to run five trips a day for a certain fixed payment. For any additional trips the Umbra Company is paid at the rate of five lire each. The local company has also the contract for delivering goods for the State Railways. No weight limit has been imposed as long as the gross load of the ordinary road wagon does not exceed 5,000 kg., and as long as the loads are kept within the running dimensions of the tramcars. Up to the present time the service of these trucks has caused no inconvenience of any kind.



Tramcar Drawing Truck Carrying Road Vehicle.



Plan and Elevation.

Truck for Carrying Road Vehicles on Tramways.

German Electrical Industry and the War.—It is reported that the Allgemeine Elektricitats Gesellschaft announced at the end of August that in view of the mobilisation it was impossible to make any deliveries. General export business has quite stopped. On war material and aeroplanes three shifts a day were being worked. Since the announcement referred to, conditions must have become steadily worse, and many German firms have issued price lists notifying considerable advances.

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ENERGY CONSUMPTION AND TRAFFIC
RECORDS PER CAR-MILE.

The accompanying diagram has been prepared for the purpose of classifying the principal municipal tramway undertakings of the United Kingdom with respect to the consumption of energy. In view of correspondence which ensued on the publication of a similar diagram in our issue of June 13, 1912, it may be well to warn readers that the idea is only to classify the undertakings. It must not be supposed that the chart affords means of exact comparison or criticism. Energy consumption is effected by such a multiplicity of circumstances, many of them necessarily conditioned by situation and other local conditions, and it would be erroneous to suppose that any one system or group of systems could be selected as a criterion. In some cases the energy consumption includes a number of other items in addition to the power actually employed in propelling the cars. In these cases it is impossible to ascertain the exact proportion, and we have had to take the figures as given in the reports of the various undertakings. At the same time, the grouping in graphic form of the facts in regard to energy consumption throughout the tramways of the country enables certain broad deductions to be made which, if intelligently considered, are certainly not without interest and value.

The horizontal lines on the diagram represent the consumption of electric energy in units per car-mile, according to the figures which appear on the left-hand side. The vertical lines represent the number of passengers per car-mile, the figures appearing both at the top and bottom of the diagram. There are also dotted lines passing diagonally across the chart, which represent the number of passengers carried per unit of energy consumed. The record of each undertaking, in respect of the quantities described, for the last year of accounts for which full particulars were available, viz., the year ended March, 1913, has been set out on the diagram and the name of the locality attached, so that their several performances can be easily recognised and compared.

We naturally find names of places in which heavy gradients are numerous, such as Burnley, near the top. In Huddersfield this condition obtains to so high a degree that its position falls outside the diagram, above its upper limit, the consumption being 2·27 units per car-mile. London, with a consumption of 2·62 units, is also outside the range of the diagram, but here the cause is different. The high consumption reigning in the metropolis appears to arise from the combination of two factors: (1) large and heavy cars; (2) density of general street traffic, which renders it necessary to use the brake frequently over a large proportion of the track. Other large towns, such as Birkenhead, are subject to like conditions, though in a less degree. Conversely towards the lower margin of the diagram are to be found the names of places situated on the level, such as Reading and others where the traffic is light and cars have seldom to be checked on account of congestion of the general street traffic, their stops being almost wholly confined to recognised stopping places. The value of current meters in fostering economy of electricity is very clearly seen in the position of such towns as Croydon, where careful driving has been made a special study.

Regarded diagonally, undertakings provided with cars of small carrying capacity should be found nearer to the right hand lower corner of the diagram than those having cars of larger size, other things being equal; and this is the case within reasonable limits.

In making any comparisons of any kind, however, it must always be remembered that the figures styled passengers per car-mile do not truly represent the number of passengers occupying a car, or the average number of passengers a car is engaged in carrying at a given moment. The figures in question have been obtained by dividing the number of passengers carried during the year by the number of car-miles run during the same period. Had the number of *passenger-miles* been known and available to us, we should have divided that figure, instead of the total number of passengers, by the number of car-miles run. This would have given the average number of passengers sitting in an average running car, but as it is we have a figure from which no very concise inferences can be made, because a passenger counts the same whether he be carried 100 yards or 10 miles. These figures, therefore, can only be employed for useful comparisons in the case of undertakings where the conditions of local traffic, with regard to long and short journeys, are very approximately the same. The figures styled "the number of passengers carried per Board of Trade unit consumed," are subject to the same inequality, and must therefore be applied with the same reservation.

RESISTANCE OF STEEL CONDUCTOR RAILS.

BRITISH STANDARD SPECIFICATION.

The attention which is now being given to the question of the electrification of railways, and the number of undertakings in hand and projected, makes the Report of the Engineering Standards Committee on the British Standard Method of Specifying the Resistance of Steel Conductor Rails of special interest at the present time. Dr. R. T. Glazebrook, in the preface, points out that considerable inconvenience has arisen in the past owing to the existence of a certain amount of ambiguity in regard to the methods of specifying the resistance of steel conductor rails, and undoubtedly anything which helps to remove ambiguity from specifications for work or materials must have considerable value, leading to a reduction both in the cost of preparing tenders and in the possibilities of dispute between the contracting parties The question was brought officially to the notice of the Engineering Standards Committee in March, 1913. It was then suggested that a conference of those interested should be held with a view of endeavouring to arrive at some general agreement as to the method to be employed in the future. This conference was held, and the result of the labours of the members, all of whom are prominently associated with railway and tramway work, was submitted to the Sectional Electrical Committee and the Main Committee of the Engineering Standards Committee, and is now issued as Report No. 68.

In the introductory remarks, an explanation is given of the reasons for selecting the particular method which has been adopted of defining the standard dimensions in terms of length and weight per yard, rather than in terms of length and sectional area. Useful tables of factors are given for converting the resistance of a rail of known weight measured at a given temperature to its value in terms of the standard. In an appendix will be found reduction formulæ, so that previous values for the resistance of rails in terms of copper may be readily reduced in values in terms of the recommended standard. The price of this report is 10s. 8d. post free, and it may be obtained from any bookseller or direct from the offices of the committee, 28, Victoria Street, Westminster.

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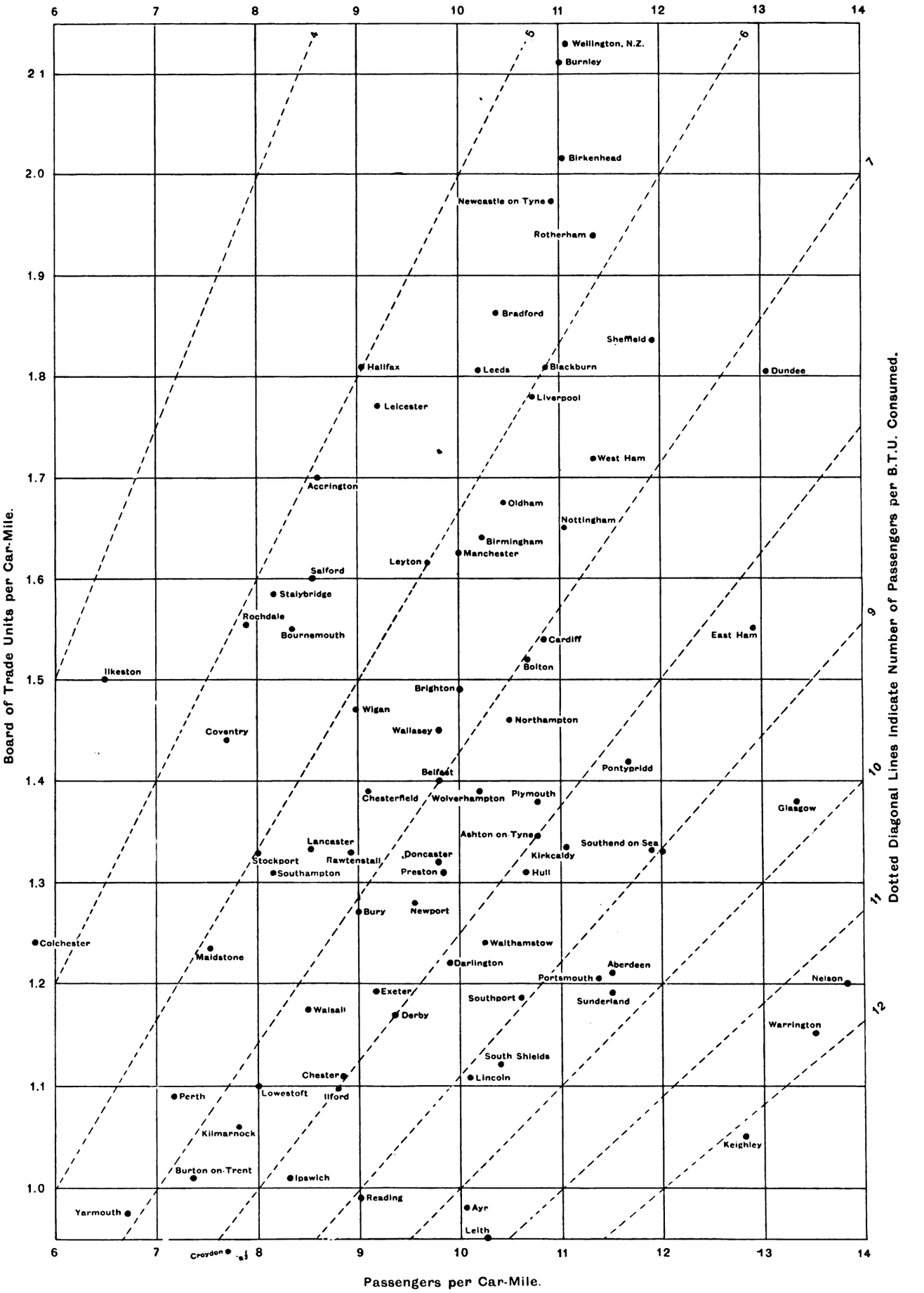

ENERGY CONSUMPTION AND TRAFFIC RECORDS PER CAR-MILE.

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THE
Tramway and Railway World

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LONDON, OCTOBER 8, 1914.

Tramways and Town Planning at Liverpool.

In this issue will be found an illustrated description of a new suburban tramway in Liverpool which presents many remarkable features and which is bound to become a Mecca for tramway officers and municipal reformers. The distinguishing characteristic which first strikes the observer is that the tracks have a grass-covered right of way to themselves, and that general traffic is provided for by a double road, part of it on one side of the tracks and part on the other. It is hardly necessary to point out the enormous advantage of this arrangement alike to the tramway, to the passengers, and to the general public using the road. If the question is asked why schemes of this kind have not been carried out extensively, the answer is simple enough, namely, that British roads are not wide enough and road authorities hitherto have not gone to the expense of widening them sufficiently. In Liverpool, however, schemes of town planning and improvements are being actively prosecuted, and this Edge Lane Drive tramway and its road are a part of these schemes. In order to appreciate the full significance of this move on the part of Liverpool Corporation, the reader should study along with the present description the admirable paper on town planning in relation to tramways which was read by Mr. J. A. Brodie, city engineer of Liverpool, at the annual conference at Newcastle in July last of the Tramways and Light Railways Association, and which was reproduced in our issue of August 13. In that paper Mr. Brodie set out his views in favour of tramways in grass in the centre of a 120 ft. road, and here now in Liverpool we have their realisation. One most material point to note is that in suburban districts it may sometimes be possible to construct a road and a tramway of this kind at no higher cost than that for a road of ordinary width with a paved tramway track. That is because land is cheap and because a cross-sleepered ballasted track with grass costs only half the money which a paved track with concrete foundations costs. Maintenance, of course, is also much cheaper and immensely more convenient.

Car Speeds.

The fact that this Liverpool tramway has its own right of way, and is divided from the carriage road by hedges, has enabled the Board of Trade to authorise a car speed of 20 miles an hour. Provided the rolling stock proves suitable, there seems to be no reason why that limit should not be further increased. In these days of swift motor cars, tramcar speeds generally must be raised, but it is on such lines as that now referred to in Liverpool that really high speeds competing with those of motor cabs and cars can be attained. Bound up with that subject is the question of stopping places. Not much benefit is to be got by materially raising the maximum speed of tramcars if stopping places remain as near to one another as at present. It is unnecessary to point out the benefits both to the tramway authority and to the passengers of high average speed, but it is of importance to insist that those benefits will never be properly realised unless the distance between stopping places is considerably increased. The greater the acceleration after starting the more energy is wasted in stopping. The longer the run without a stop at any given speed, the higher the average speed. So to spread the population out, many stopping places on ordinary tramways should be abolished. On such special tramways as that in Liverpool, it is absolutely necessary

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that the stops should be well spaced out. Inherently there is nothing new in the Liverpool arrangement, as lines of the kind have long been in service in America and on the Continent. The sooner British road authorities in their town-planning schemes provide for such roads with grass track tramways on them the better.

Cost of Ticket Checking.

The object of issuing tickets to passengers on tramcars and other public service vehicles is, of course, primarily to give them authority to travel a certain distance and no more in these vehicles, in consideration of fares paid, and in the second place to inform the service management as to the number and value of such fares—in other words, to make sure that the receipts are correctly handled and accounted for. This is such an important matter that it will clearly be profitable to spend freely on what is really a non-productive part of the business. Both passengers and working staff must be continually and continuously checked in this direction in the interests of the service and, human nature being what it is, the amount and cost of checking required may very soon reach a proportion and figure not easily credited, when the work is thoroughly and efficiently carried out. The manager of any transit system is therefore faced in this direction also with the usual problem of "balancing"; he must spend on the work of checking throughout the system considerably less than the saving of possible losses otherwise incurred, and he has therefore to be continually estimating the latter in order to know how far he may push his expenditure on ticket examiners and all other forms of checking, above a certain irreducible minimum. When one realises that the cost of this department alone—provision of tickets and wages of checkers, etc.—may easily reach 5 per cent. of the total traffic expenses, it is not to be wondered at that any appreciable saving should be welcomed by the management. Take for instance the Glasgow tramway system, regarded in many points, and rightly too, as a model for others to follow, the total cost of checking, minus the amount received for advertisements printed on the back of tickets, reaches a sum of nearly £16,000 per annum; and obviously therefore great care is necessary to prevent these outgoings (small as they may appear by comparison with the total receipts on a big system) from increasing unduly beyond any prevention of loss they may secure.

British Industry and the Dominions.

A letter which has recently been sent out by the Imperial Motor Transport Council over the signature of its chairman, the Hon. Arthur Stanley, dealing with the disturbance of the conditions of trade owing to the war, deserves the widest possible publicity. Although the text is given elsewhere in this issue, we wish here to emphasise the importance of this appeal to support British industry. It is, perhaps, scarcely realised by the public how great are the efforts of British firms to keep open their works, and to conduct business as usual. To do this requires in many cases much corporate and individual sacrifice, which is willingly borne for the public good; and there is no doubt that, when residents in the Dominions and Colonies recognise what great efforts are being made, they will aid British firms as far as possible to carry on the policy adopted from the very commencement of the war. Their help will be of the utmost value in many ways, but the best assistance they can give is the placing of orders for supplies and machines of British manufacture. To purchase from other countries at the present time is not only to deprive this country of immediate material assistance, but also to pave the way for the permanent loss of trade which could now be secured for British industry. Every order sent outside the Empire is an advertisement which will prove of advantage to our competitors in the future. It is consequently of no small benefit to Great Britain to have the cordial support of our oversea friends. In directing their orders to us they suffer no disadvantage except the possibility of a little delay. The products they will obtain are, as Mr. Stanley says in his letter, "at least as good value as any obtainable elsewhere." That is absolutely true; and if put a great deal more strongly it would still be true. Where we have lost trade in recent years, it will generally be found on investigation that quality has had nothing to do with it. Many influences have been at work, and we have not always been as watchful or as alert as might be wished in the face of such rigorous competition; but the reputation of British manufactures is still

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unsurpassed. With the self-deprecatory attitude characteristic of the British race, we sometimes give ourselves less than due credit for the high position British industry enjoys throughout the world. It was not attained by bluster or by misrepresentation, but by sheer merit; and it is by the same quality that we shall maintain and extend our trade to a degree that will surprise those who have without warrant assumed that our merchants and traders have lost their initiative and enterprise. But we want particularly at the moment all the help our oversea Dominions can give. Much of our energies must for some time to come be devoted to the prosecution of the war so wantonly and unscrupulously thrust upon us. In the meantime, the opportunity is not being neglected by competitors in neutral countries. We do not complain of this: they have every right to redouble their efforts to extend their own trade; but we look with confidence to our Dominions oversea to use their influence in our favour at a time when our hands are given to the more important task of saving Europe from the domination of a power to whom might is admittedly the only criterion of right.

RAILLESS TRACTION AT BRADFORD.

The railless system on the section from Laisterdyke to Dudley Hill, Bradford, has now been in operation about three years. Although there is again a loss on the working, Mr. C. J. Spencer, general manager, in his annual report alludes to the feeding value of the route. He does not feel the slightest doubt that if, for example, the last penny stages of the tramway lines were separately accounted for it would be found that they were, on a similar basis, unprofitable. It is, therefore, entirely wrong and misleading to say that the tramway department is losing money on its railless trolley system. The system was put down experimentally, and the Corporation has gained considerable experience which could not otherwise have been obtained. Designs for a special type of car were prepared some time ago, and a contract for 28 chassis was placed with Messrs. David Brown and Sons, Limited, Huddersfield. Some of these are now in service on the routes authorised by Parliament in 1912 and 1913, and others will be ready shortly.

Mr Spencer thinks that the relative merits of railless trolley and motor omnibuses turn, broadly speaking, on the question of running costs. He continues: "It ought to be possible to construct and operate a railless trolley car, which would run more silently and with less vibration than a petrol-propelled vehicle, and I believe that that has already been achieved by the new cars at present in service, which are running exceedingly well, and give a reliable service to districts where tramway construction was impossible, due to the heavy capital expenditure. As matters stand at present, I am of the opinion that railless cars will be operated at a considerably cheaper rate than it would be possible to operate motor omnibuses where there is a service of half an hour or less. Where, however, the population to be served is so sparse that only a very slow service can be supported, and where consequently the car-mileage is very low, it may be more economical to run a petrol omnibus."

Catalogues for South Africa.—Catalogues or price lists of foreign firms addressed to importers, merchants, or manufacturers in the Union of South Africa will now be admitted free of duty. A previous duty has been charged of 25 per cent. *ad valorem* or 2d. per lb., whichever is higher, with a rebate to British goods of 3 per cent. This alteration in the law of the Union of South Africa was initiated by the British Electrical and Allied Manufacturers' Association, and was effected through the instrumentality of Sir R. Sothern Holland, H.M. Trade Commissioner, Cape Town.

TRAMWAY MEN WITH THE COLOURS.

By the courtesy of tramway managers throughout the country, we have received reports of the number of tramway employees who had joined the colours up to September 30. The numbers for the respective Corporations and companies are given in the following list, and, in most cases, the percentage of the staffs who have left for service is also given.

The total number of tramway employees now serving their country in the Army and Navy is 10,688.

Corporations.	No. joined the colours.	Per cent. total number.
Aberdare	2	2
Aberdeen	57	17·54
Accrington	6	6
Ashton-under-Lyne	16	20
Ayr	8	—
Barking Town U.D.C.	4	20
Belfast	116	12
Bexley U.D.C.	18	23
Birkenhead	47	20
Birmingham	697	20·6
Blackburn	54	15
Blackpool	36	9
Bolton	45	9·5
Bournemouth	118	23·35
Bradford	132	9·5
Brighton	73	33·33
Burnley	93	27·5
Burton-on-Trent	8	9
Bury	38	13
Cardiff	130	17·5
Chester	10	20
Chesterfield	34	25
Colchester	16	25
Colne	10	20
Coventry	38	12
Croydon	48	13
Darlington	11	17
Darwen	8	12·5
Derby	20	8
Doncaster	6	4
Dover	21	38
Dundee	45	17·3
East Ham	54	21
Erith	5	10
Exeter	16	20
Glasgow	1500	27
Gloucester	23	18
Great Yarmouth	18	14
Halifax	49	13
Huddersfield	50	10·4
Hull	135	14·5
Ilford U.D.C.	20	14
Ilkeston	8	20
Ipswich	23	18
Keighley	6	10
Kilmarnock	13	41
Kirkcaldy	7	11
Lancaster	4	18
Leicester	130	12
Leyton U.D.C.	76	21
Liverpool	600	26
London County Council	1294	10·5
Lowestoft	19	17
Luton	9	25
Maidstone	14	24·1
Manchester	740	14·22
Nelson	10	16·66
Newcastle	192	19
Northampton	13	9·5
Nottingham	78	12
Oldham	87	16
Pontypridd	11	6·5
Portsmouth	122	—
Preston	28	12·8
Rawtenstall	6	4·75
Reading	36	20
Rochdale	34	11·33
Rotherham	22	14
Salford	210	18
Sheffield	230	12·8
Southampton	57	14
Southend-on-Sea	29	12
Southport	16	18
South Shields	15	10
Stalybridge	40	14·3
Stockport	35	13
Sunderland	28	9·4
Swindon	9	22·5
Wallasey	51	19·2
Walsall	22	14
Walthamstow U.D.C.	27	15·33
Warrington	10	11
West Hartlepool	19	18
West Ham	141	22
Wigan	21	8
Wolverhampton	26	12
	8,403	

Companies.	No. joined the colours.	Per cent. total number.
Aberdeen Suburban	5	—
Airdrie and Coatbridge	7	10
Barrow-in-Furness	21	25
Bath	53	20
Blackpool and Fleetwood	6	6
Blackpool, St. Annes, and Lytham	21	14
Birmingham District	24	9
Bristol	499	—
Carlisle	5	12
Chatham and District	59	24
Cheltenham and District	26	30
Cork	22	8
Dublin and Lucan	2	2
Dublin United	52	3·8
Dudley, Stourbridge, and District	19	10
Dumbarton Burgh and County	7	12
Dundee, Broughty Ferry, and District	5	12
Dunfermline and District	23	26
Giant's Causeway and Portrush	9	20
Glossop	2	3·4
Gosport and Fareham	17	15
Gravesend and Northfleet	11	13
Guernsey Railway	10	10
Hastings	35	13
Isle of Thanet	33	16·5
Jarrow	7	23
Lanarkshire	67	20
Lancashire United	45	10
Liverpool Overhead Ry.	36	10
Llandudno and Colwyn Bay	7	17
London United	224	16
Manx Electric Railway	16	15
Merthyr	8	10
Metropolitan Electric	379	24
Middlesbro', Stockton, and Thornaby	40	12·5
Middleton	7	9
Norwich	28	12
Oldham, Ashton, & Hyde	15	10
Peterborough	3	6
Plymouth, Stonehouse, and Devonport	4	10
Portsdown and Horndean	2	5
Potteries	85	11·5
Rhondda	33	12
Rothesay	4	12·5
South Metropolitan	54	25
Southport	2	3
South Staffordshire	13	7
Sunderland District	21	16·15
Sutton and Howth	2	10
Swansea	65	15·22
Taunton	2	10
Torquay	31	24
Tynemouth and District	6	10
Tyneside	12	10
Weston-super-Mare	16	10
Wolverhampton District	9	8
Worcester	6	7
Yorkshire (West Riding)	39	10
Yorkshire (Woollen Dist.)	24	10
	2,285	

In continuation of the information given in our issue of September 10 with regard to arrangements made

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by Corporations and companies for payments to their employees while on service, we append the following:

Birkenhead Corporation Tramways.

The number of employees of this department who have joined the colours has been increased from 16 to 47, the figures being made up as follows: Clerical staff, two; drivers, 12; conductors, 24; shed employees, seven; and point attendants, two. Of the traffic staff 36 out of 130 have joined the colours.—C. CLARKE, tramways manager.

Blackpool Corporation Tramways.

The Special Committee dealing with the question of allowances to Corporation employees on war service, at their meeting on the 1st inst. decided to allow the wives of all men serving with the colours 12s. 6d. per week plus 2s. 6d. per child, and single men half wages as a minimum. Any cases of special distress will be dealt with on their merits.—CHARLES FURNESS, general manager.

Dunfermline and District Tramway Company.

Altogether 25 men have now left for the Army, all are single men.—JAS. H. SHEPHERD, manager and engineer.

East Ham Electric Lighting and Tramways Department.

Fifty-four of our staff have joined the colours up to September 30, 1914, equivalent to 21 per cent. of the total number of employees. The following are the conditions and rates of pay granted by my Corporation to all men going on service: Any officer or servant of the Corporation who, as a member of His Majesty's Forces, has, or may volunteer for service, or be affected by the mobilisation or embodiment consequent on the present European crisis, shall be allowed leave of absence during such service; that they be reinstated upon their return without loss of position or emoluments consequent on their enforced absence; and that the Corporation do pay them (or such person or persons as they may appoint) during such service, (*a*) in the case of married men full pay less the amount received from His Majesty's Forces for separation allowance, (*b*) in the case of women and single men full pay less the amount of pay received from His Majesty's Forces; and that any man who obtains promotion after joining the service be allowed the same rate of pay from the Corporation as if no such promotion had taken place. This means that in the case of married men the separation allowance granted to the wife and family only is deducted from the full pay, and any money received by the man himself for his duties as a soldier, in any rank whatever, is additional, and is not taken into account by the Corporation. In the case of single men the pay he receives as a soldier is deducted from his full pay, and the balance is paid to anyone he may appoint.—W. C. ULLMANN, engineer and manager.

Halifax Corporation Tramways.

The Corporation have decided to give all municipal officers and employees who have joined the colours leave of absence and to pay them or their nominees during their absence from civil duty full salary or wages, less a deduction of the amount payable to them by the Government as Navy or Army pay and allowances. Forty-one employees of the tramway department have now left for service.

Lanarkshire Tramways Company.

The number of our employees who have joined the colours are as follows: 25 motormen, 23 conductors, and 17 other employees. The company has granted 10s. per week to wives and dependents, and in the case of married men, 1s. per week per child.—G. F. MOLLER, general manager.

Musselburgh and District Electric Light and Traction Company.

Two drivers, one conductor, and nine other employees have joined the colours. The company have granted the following conditions to these employees and their dependents: Payment to wife or other relative dependent on wages, 7s. 6d. per week; for each child in addition, 1s. 6d. per week, without any deductions whatever.—R. WATSON, manager.

Salford Corporation Tramways.

The following employees are away on active service: 67 motormen, 90 conductors, and 39 other employees. The Corporation have granted to each employee on active service such an amount as will, in addition to Government pay or insurance benefit, make up the employee's usual weekly wage paid by the Corporation.—G. W. HOLFORD, general manager.

Swindon Electricity and Tramways Department.

Up to September 30 nine members of the tramways staff have joined the Army, two motormen and seven conductors. During the men's absence on service full wages less Army allowance will be paid, and their positions kept open on their return.—T. MEDCALF, tramways manager.

Yorkshire (West Riding) Electric Tramways Company, Limited.

The following employees of the company have been called up for active service: Five motormen, 11 conductors, and 21 other employees. When war was declared arrangements were being made for the employees' annual outings. All arrangements were cancelled, and the employees have decided that the amount of the grant which would have been made by the directors of the company towards the expenses of the outing, viz., 6s. 6d. per head, shall be placed to a special fund for the maintenance of the wives, families, and dependents of the men called to the colours. The directors have doubled this, and the fund is being administered by the employees' permanent consultative committee. First grants, varying from 5s. to 20s. have been made, and it is proposed to make grants fortnightly as may be necessary. When the fund now in the bank has been exhausted it is probable that a levy will be made upon the men and a further contribution given by the company.—H. ENGLAND, general manager.

SUPPORT BRITISH INDUSTRY.

The following letter has been sent out by the Council of the Imperial Motor Transport Council over the signature of its chairman, the Hon. Arthur Stanley, and we are confident that the views therein expressed will receive the attention and approval of readers both at home and overseas.

Sir,—While this Council is concerned only with a particular branch of industry and progress, the arguments applying in one case are likely to hold good equally in many others.

Among the inevitable consequences of a great war is a certain amount of disturbance in the conditions of trade and industry. Admittedly, the demand for certain classes of touring motor cars has been seriously affected, and the purchasing capacity of the public within the British Isles must necessarily be reduced for a time. On the other hand, military requirements are, for the time being at least, keeping our manufacturers of industrial vehicles extremely busy. Numbers of motor vans, lorries, and private cars have been requisitioned by the War Department, and the majority of these will have to be replaced. In many instances, however, firms whose cars have been requisitioned may delay the renewal of their fleet owing to a temporary decrease in business.

All manufacturers in the motor industry—and, in fact, in every other industry—who have the welfare of the British Empire at heart, are endeavouring, often under somewhat adverse conditions, not only to keep their works open, but to retain the whole of their staff in employment. This is a time during which residents in the Dominions and Colonies can be of great assistance to the Mother Country in many ways. For example, those who are contemplating the purchase of motor vehicles of all sorts should make a point of assisting the British industry to tide over the present crisis by placing orders for machines of British construction, even if by doing so they put themselves to some slight inconvenience owing to possible unavoidable delay in delivery. It is very desirable that they should support British industry, not only on account of present difficulties, but because it would be extremely unfortunate if British manufacturers were to suffer permanently from loss of trade in the Empire overseas, owing to the participation of Great Britain in the present war.

Those who agree that our cause is a just one, and that our action was necessary, will, I feel sure, endeavour to conform with the suggestion contained in this letter. As already stated, the argument applies not to one trade, but to many. It should be remembered that a motor car is, in a sense, a moving advertisement, provided that it is a satisfactory vehicle. To purchase from countries other than Great Britain at the present moment is to give trade competitors the permanent advantage of such advertisements, every one of which is likely to prove the nucleus of a considerable number of subsequent orders. The contention that this is a time during which British industry should be given the best possible chance of establishing itself throughout the world is not based purely on sentiment. In the industry under consideration, as in many others, we know that British products are at least as good value as any obtainable elsewhere. It is not suggested that anyone should be asked to buy inferior goods when better are available at the price, but only that if, in purchasing from Great Britain, they suffer certain inconveniences, they should regard those inconveniences as a much needed contribution towards the maintenance of many thousands of families within the British Isles, who are threatened with poverty if everything possible is not done to maintain British trade.

ARTHUR STANLEY,
Chairman, Imperial Motor Transport Council.

Fully Equipped Battery.—Messrs. Docker Brothers, Limited, varnish, japan, and colour manufacturers, of Saltley, Birmingham, have made a very practical and valuable response to the appeals for assistance in the present crisis. They have presented to the War Department (which accepted with grateful thanks) a fully equipped battery of four heavy guns, comprising the following: 240 men (including N.C.O.'s), seven mounted officers (including a major, two captains, and four lieutenants); four 4·7 guns, each with eight horses; and 30 wagons, each with four horses. With the battery goes a full equipment of ammunition, kit, lifting and hauling tackle, scientific instruments, etc., as also a completely equipped ambulance section. The total cost has been over £10,000. The battery as a unit has been invited to volunteer for immediate active service. In addition to this, the number of reservists employed by the firm will bring the total number of men mobilised to well over 500. The firm has undertaken to provide for the wives, families, and dependents of the whole of these men apart from any outside relief.

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RAIL CORRUGATION.*

By M. E. Resal

(Manager of the Bordeaux Electric Tramway and Omnibus Company).

The industrial application of electric energy to traction, which gave so great an impetus to the tramway industry, took place about 25 years ago. Since that time, great improvements have been made in the rolling stock as well as in the track and lines, and have remedied the greater part of those initial troubles which only experience could reveal. But, unfortunately, in rail corrugation we have an evil of long standing which still exists in spite of most careful study. The search for means of eliminating or lessening this evil has been on the agenda of the Congress of the International Union on five successive occasions; in other words, it has occupied the attention of managers for over eight years. One point, however, has been settled once and for all, that is, that the rail itself contains the germ of the corrugation; and this germ is found in the heterogeneity of the metal, due to the kind of friction that the rail undergoes in the process of rolling. Mons. Busse showed this at previous congresses in the circumstantial reports which he had drawn up, and we shall see this confirmed further on by fresh facts. But though the rail which undergoes corrugation has been carefully studied, the vehicle that produces it has not, at any rate in the reports that have been submitted to the Congress. Replies previously given by the members of the Union to the questions which have been put to them have been inexact and contradictory. When the committee of the International Union proposed to give to us the perilous task of making a report upon this troublesome question, we did not know that anything had been published treating specially on the part played by the rolling stock in the formation of rail corrugation, other than the following:

Rail Corrugation, by Manaut (*La Lumière Electrique*, Feb. 22, March 14, 1908); Rail Corrugation, by Bacqueyrisse (*L'Industrie Electrique*, August, 1908); G. E. Pellisier (*Electric Railway Journal*, 1911).

* A paper prepared for the Budapest Congress of the International Tramways Union, which was abandoned owing to the European War.

We then decided to devote the greatest attention to the rolling stock, and it was with this in mind that we drew up the series of questions to the members of the Union, while making such experiments as were possible with the means at our disposal. These experiments had been completed when we received in December, 1913, thanks to the kindness of Mons. Camp, secretary of the Union, the last report of the English Association of Municipal Tramways, dated August, 1912, to which we will return later.

We have prepared a detailed report of our observations and experiments, not only to justify our conclusions but also for the use of engineers, who may wish to make similar experiments. However positive our results may appear to us we recognise that they cannot be considered as decisive till they have been confirmed by many similar experiments made by others on different rolling stock. That report forms an appendix to this paper. We will confine our remarks at present to the various conclusions which it contains with reference on the one side to the rails and on the other to the rolling stock.

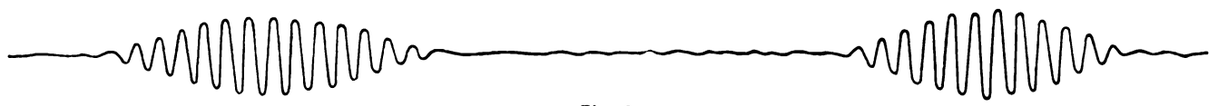

Fig. 1.

When a carriage with parallel axles mounted upon a Brill truck runs upon a straight line the axles take on from time to time a horizontal movement as soon as the speed attains 10 or 12 miles an hour. The period of this movement is about $\frac{1}{20}$ of a second and is not dependent upon the speed of the vehicle. The extent of the movement, however, increases with the speed. If the wheel treads are conical, the vibratory movement of the axles is much more frequent than if they are cylindrical, and the amplitude of the movement also appears to be greater. This vibratory motion results in a skidding along the rails, and this skidding may be increased by the vibratory torsion of the axles whose periods are also about $\frac{1}{20}$ of a second. The distance run by the car during a half period is naturally proportional to its speed. It is 84 millimetres for a period of $\frac{1}{25}$ of a second at a speed of 15 kilometres an hour, and attains 290 millimetres for a period of $\frac{1}{100}$ of a second at a speed of 30 kilometres. Finally the total skidding of a wheel may attain 2·4 per cent. of the distance run, even taking the worst case when the total skid due to the difference of the circumferences of the conical form of two wheels does not exceed 1·2 per cent. of the distance run over.

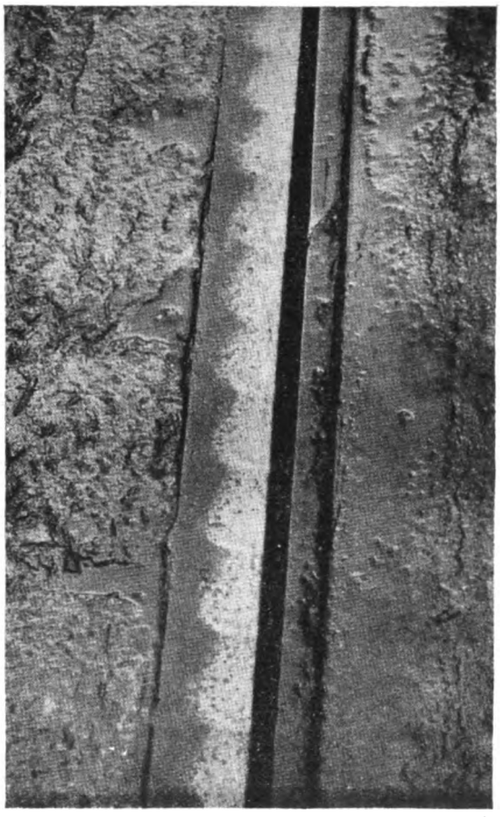

Fig. 2.

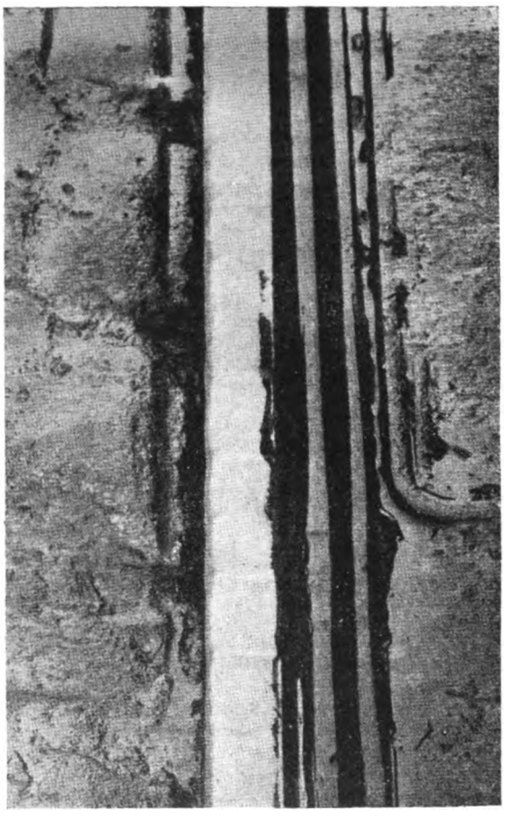

Fig. 3.

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Rail corrugations may be considered non-existent upon tracks where the speed never exceeds 12 to 15 kilometres an hour. The length of the corrugations varies between 40 and 90 millimetres, with an average of 60 millimetres; wave lengths between 90 and 250 millimetres are very exceptional. The length of these corrugations does not depend upon the speed of the cars. The reduction of the height or absolute wear of the tread of the corrugated rails if not equal to, is at least equivalent to, that of the rails which are not corrugated but which are in the same stretch of track. While this absolute wear may attain nine millimetres, the depth of the wave is always about one millimetre. Depths greater than two millimetres are very rare. A car running on a straight line takes a hunting movement of isochronous oscillation. If such a car runs over a track with alternating lengths of corrugation, and is travelling at the normal speed, the hunting is in phase with the alternations.

From these discoveries two conclusions immediately arise. First, the length of the waves is entirely independent of the vibration of the axles; therefore, it is due to the nature of the metal. Secondly, the corrugations do not appear upon lines traversed at low speed; therefore, a speed exceeding a certain minimum is a necessary condition for their formation.

Rail corrugation is due to a large number of factors whose relative importance may vary on different systems. That is no longer questionable. Allowing, however, for this variability, it is probable that the general and principal conditions for the formation, and the persistence (or disappearance) of rail corrugations are as follows: When the speed reaches a critical point, somewhere between 12 and 15 kilometres an hour, the axles are liable to assume from time to time a horizontal oscillation which dies out more or less quickly. This oscillation can be represented diagramatically by a line showing a series of waves (Fig. 1). The amplitude of the vibrations increases with the speed of the car. The number and the length of the series of waves, as well as the amplitude of the vibrations, are a functional characteristic of the car. Conical tires specially favour this. Unusual circumstances, notably violent starting or braking, can cause vibrations even below the critical speed. These oscillations produce rail corrugations by a series of changes which form two successive stages.

In the first stage the wheels skid strongly upon the rails. If the hardness of the rails is not regular the skidding has a greater effect upon the softer portions and small corrugations are commenced by the tearing out or wear of the metal. The form of these initial corrugations appears to be due to the movement of the wheel upon the rail (Fig. 2).

When these corrugations become deep enough the skidding of the wheels is assisted by the hammering caused by the wheels falling into the hollows. This is the second stage. This hammering changes the shape of the waves, and forms them according to the variation in the structure of the metal (Fig. 3).

The effects of the skidding and the hammering depend not only on the nature of the metal of the rail but also on that of the tire. If the hammering predominates, and if the rails are not very malleable, the corrugations will not travel but will become deeper. If the skidding predominates, on the other hand, or if the metal of the rail is very malleable, the corrugation moves along in the direction of the cars. The crest moves towards the hollow of the following corrugation at the same time as its height diminishes, either by abrasion or by cold rolling. The depth of the corrugation thus diminishes and it may disappear.

When a car comes to a place where the rail is very low (*a* in Fig. 4) it slides over towards the lower rail by the action of gravity. This action sets up a rhythmical hunting of the car, or if this motion had already started before the car reached *a*, it lengthens the periods by a phenomenon of synchronisation easily understood. From that

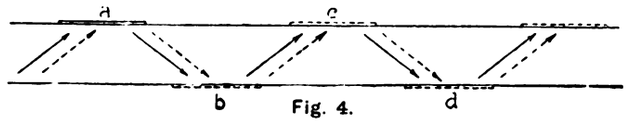

Fig. 4.

moment the oscillation takes place as shown by the full arrows (Fig. 4), and the car goes over towards *b*, *c*, *d*, etc. At each of these places the movements of the axle are produced either by the difference in diameter of the tires of the two wheels of this axle if they are conical, or even merely by the rubbing of the flange of the wheel upon the rail owing to the strong pressure which the carriage puts upon it; and corrugation is then produced. All cars of a similar type (that is to say having the same hunting periods) which are going at the same speed behave in exactly the same manner, and the places *a*, *b*, *c*, *d*, become alternate lengths of corrugation. The violent shocks produced by the passage of cars over a corrugated part, for instance the length *a*, disintegrate the foundation and increase the length and depth of the depression. The oscillation of the car is then modified a little, as the dotted arrows show at the points *a*, *b*, *c*, and *d*. Hence they become longer in their turn, and end by producing continuous corrugation.

The dust of hard substances between the rail and the wheel increases the effects of the skidding. It is also probable that these are greater if the tire is harder than the rail.

The hammering tries the rail more severely the more rigid the foundation and the harder the tire. That is the natural result of the old theory of shocks, but in those places where the foundation has given way, and where the rail has to carry more than it ought, the vibrations which result from the passage of the axle are of a kind to increase the hammering.

The hammering of the hollows of the corrugations makes the metal harder and consequently less easily attackable by the skidding; and moreover the crests are more exposed to the skidding. This governs the limit to the depth of the corrugations, which depth depends upon the quality of the metal and of the foundation. Therefore these corrugations do not vary greatly in depth during the time, sometimes very long, which it takes to wear out the rail.

Such are in our opinion the general conditions of the formation of corrugations with the exception of particular circumstances which may have exceptional importance on certain systems. In order that this explanation may be accepted it must agree with facts ascertained on various tramway systems.

Seventy undertakings have replied to the questions which have been addressed to them by the Union. These replies have contained much information, and we sincerely thank their authors for the assistance which they have given us. At the same time, however, we wish to express a regret, and also to offer an excuse. The apology is for having included in the list of questions so large a number and such varied inquiries that it must have seemed to some that we had exceeded the bounds of discretion, and yet none of the information asked for was superfluous. The regret is that so few undertakings have replied fully to the questions. We are particularly thankful to those who have had the courage to do so, but the small number of them has not allowed us to make comparisons which would perhaps have elucidated certain other aspects of the question.

Out of the 70 undertakings which have replied there are 10, the newest of which has been in existence for six years, which are fortunate enough to have few or no corrugations (Astrakhan, Brunswick, Budapest, Liege, Marseilles, Neuchatel, Tientsin, Brussels, Cairo, Roanne).

We must admit, after examining and carefully comparing the information furnished with regard to the permanent way and rolling stock, that there was no difference between systems troubled by rail corrugations and those which have escaped almost scot free sufficiently striking to enable it to be affirmed where the essential cause of rail corrugation will be found. This discovery would have been important had the numerous investigations which have already been made into the subject not shown that this plague is caused by the combination of a very large number of more or less important factors. This opinion is therefore confirmed, but at the same time we must continue to seek for the causes in the minute differences which a comparison of various systems may present.

In almost all the undertakings the rolling stock most used consists of cars with two parallel axles, whose characteristics are:

Wheel base	.. ..	1·8 to 2·2 metres.
Overhang	.. ..	2·8 to 3·5 metres.

The rolling stock of the 10 fortunate companies is of this kind. It may be seen, therefore, that a small wheel base and a long overhang, which evidently favours oscillation, are not conditions necessary for the formation of rail corrugation, but this does not prove that they do not contribute to their development when once they have started.

A few systems make use of bogie cars, either alone or in conjunction with parallel-axle cars. It is not clear that bogies with one or two axles are free from oscillations producing, from our point of view, the same effects as do cars with parallel axles. We ought, however, to remark that the London County Council has observed that cars with parallel axles set up corrugation more rapidly than cars with bogies. The axles are of the following dimensions:

Diameter of axles	..	95 to 115 millimetres.
Diameter of wheels	..	800 to 870 ,,

Details supplied as to the car suspension are few in number and almost all incomplete; no deduction can be drawn from them.

In the majority of the undertakings the tensile strength of the rails is about 75 kg. per square millimetre, and that of the tires about 80 kg. If the hardness of a metal can be measured by its breaking point, one must conclude that the tires are generally harder than the rails. This peculiarity is also found in undertakings which are free from rail corrugation. That shows that if this fact favours the development of corrugation, it is not a necessary condition of its formation.

In undertakings where there are corrugations, the rails are most frequently placed upon a longitudinal strip of ballast or concrete, and occasionally upon wooden sleepers, either cross or longitudinal. The rails on those systems which do not suffer from corrugation are placed either on ballast or on cross sleepers, but never on concrete. This must be remembered. It justifies the influence which is attributed by certain undertakings (Bonn, Geneva, Leipsic, Lyons, Munich, Vienna, Budapest, Moscow, and Warsaw) to the rigidity of the foundation. It justifies also the observation made a little while ago that if the skidding of the wheels produces corrugations, it tends also to flatten them out again, while hammering, which is evidently

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increased by the rigidity of the foundation, tends on the contrary to deepen the corrugations. At Moscow they have observed that the corrugations are started most often in winter, when all the foundation is frozen and consequently solid. At Geneva, also, they have observed a rapid increase in the corrugations upon tracks where rails are fastened to a rigid base.

On the systems from which we have received information the sub-soil is sometimes permeable (sandy gravel), sometimes partially permeable, and sometimes impermeable (solid clay). Advantage could only be taken of this if the amount of the wear was ascertainable on the various kinds of sub-soil, and also if note had been taken of the rainfall, which endangers the stability of the line, and on the other hand of the measures taken to lessen the effect of leakage. The system at Munich is upon permeable ground, and care has been taken to ensure the drainage of the ooze which penetrates under the rails. This system was opened in 1895, and the corrugations did not appear before 1907. The undertaking attributes this to a considerable increase in the service at that time, but may we not think that as the effect was not evident for 12 years it was due to the perfect condition of the tracks, to which the drainage certainly contributed? On the other hand, we cannot but be struck by the fact that out of the 10 undertakings where no corrugation has taken place three of them, and those the most important (Cairo, Marseilles, and Tientsin), are in climates where the rainfall is slight. It is certain that these systems have not to undergo the frequent soakings which are the principal cause of the deformation of the track. They should therefore present few, if any, of those inequalities which, as we have premised, determine the initial lengths of corrugation caused by the oscillation of the cars and by the conical form of the wheels.

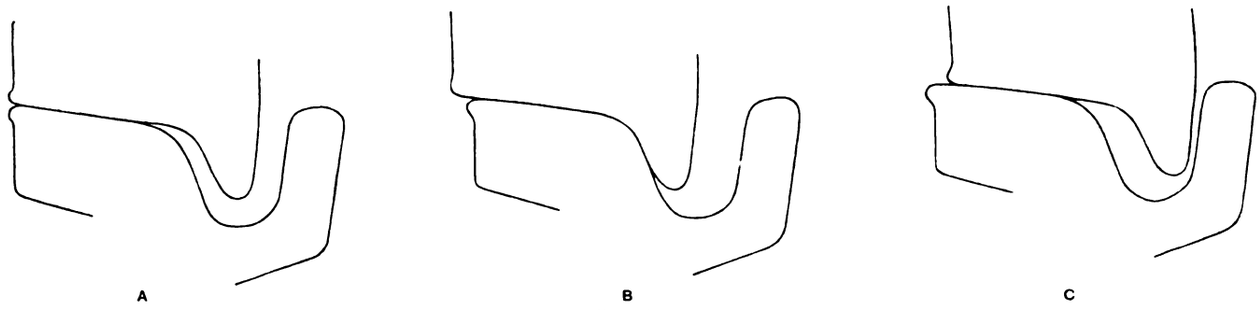

Fig. 5.

wheel on the axle is in the same condition, everything takes place as if the two wheels remained cylindrical.

In the systems of the first category the conical wear of the tires is eminently favourable to the increase in the oscillations of the axle to which our explanation attributes the commencement of corrugations. In the systems of the second category the quasi cylindrical wear of the tire does not favour these oscillations. We should add the following fact, which was brought to light in the reply of the Light Railways of Algeria. This company makes use of tires whose tread is 62·5 mm. broad. As long as rails were used whose tread was between 40 and 44 mm. in breadth they did not find any corrugation. Rails of 55 mm. on the tread were corrugated within a year after they had been put down.

Besides the details given from the design of the rolling stock and of the track, the replies to the questions contained some further information as to corrugation. The types of roadway upon which the greater tendency towards corrugation occurs are macadam (Aix-la-Chapelle, Dusseldorf, Geneva, Trieste, Zurich), and asphalte (Bonn, Friedrucksburg, Dortmund, Dusseldorf, Mulheim, Nuremburg, and Zurich). The rails on asphalte are necessarily placed upon a rigid base, and it is undoubtedly for this reason that this kind of road construction, which indirectly favours hammering, frequently gives rise to corrugations. The same reason, no doubt, explains why it is met frequently upon conduit systems. As for macadam where the tracks can be, and frequently are, placed upon ballast, it is the dust of the hard stone between the wheels and rails which produces the corrugations by increasing the effects of the skidding.

The great majority of undertakings have recorded alternative stretches of corrugation. It is possible that their formation in alternate lengths

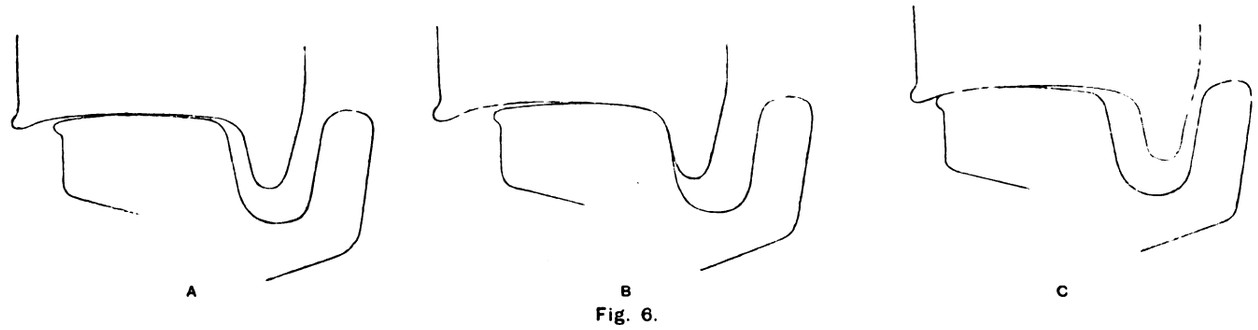

Fig. 6.

We have kept for the end of this rapid survey of the materials, the point which constituted an evident difference between the systems with corrugations and systems without. In those of the first category the width of the tread of the wheel is generally less or equal to that of the rail, and those undertakings which have given information as to the deformation due to the wearing out of the tires and of the rails have supplied sections similar to those in Fig. 5. When the width of a tire tread is equal or only slightly larger than that of the rail, the play between the flange and the rail allows the wheel to shift sideways, and to take up the extreme positions shown in *B* or *C* from the very beginning. These sections show that the part in the rail which is most worn is the inner side of the tread, and in the wheel the outer side of the tire. This explains the turning over of the tread and the conical wear of the wheel, even when the new tire was originally cylindrical. In the systems of the second category, on the contrary, the width of the wheel tread is considerably greater than that of the rail tread, and the systems which have given information about the deformation by the wearing out of tires and of rails (seven out of 10) have given results like those at *A* (Fig. 6.) The wheel tread has a very large radius, the chord of which is parallel to the axle, and the tread of the rail has a similar arc, the chord of which remains parallel to the original surface of the rail tread. The tire is, it may be said, doubly conical, and when, as a result of the initial or acquired play, the wheel takes up the extreme positions in *B* and *C* (Fig. 6) it runs on its greatest circumference, but when the other is produced in conditions which could not easily be observed by the undertakings which have replied in the negative to the question (Augsbourg, Bonn, Breslau, Budapest, Cologne, Hessian Railways, Dresden, Barmen-Elberfeld, Hagen, Liege, Munich, Stettin, Trieste, and Vienna). There is one case where alternation is almost immediately followed by continuity; it is where cars of different types are run on the same line, the oscillations of which are consequently varied in character. Referring to Fig. 4, it is seen that an inequality at *a* would give rise in one type of vehicle to alternations at *b*, *c*, and *d*, but with a different type it would produce similar alternations, only further off or nearer, which joining to those at *b*, *c*, and *d* would establish continuous corrugations. The fact that alternations appear in the majority of the systems justifies the explanation which has been given; and the fact that in the other systems these alternations have not been observed is in no wise a contradiction. The majority of the undertakings recognise that corrugation does not appear, or appears less frequently, under the following conditions: (1) In curves of a radius less than 30 metres (Aix-la-Chapelle, Amsterdam, Bonn, Budapest, Dusseldorf, Geneva, Magdeburg, Mannheim, Paris (C.G.O), and Zurich); (2) upon steep grades (Aix-la-Chapelle, Bremen, Budapest, Chemnitz, Dortmund, Geneva, Leipsic, East Parisian, Lyons, Magdeburg, and Treves); (3) just before stopping places (Bonn, Chemnitz, Cologne, Barmen-Elberfeld, Dusseldorf, Helsingborg, Magdeburg, Nuremburg, Paris (C.G.O), Prague, Trieste, Algerian Railways); in other words wherever the speed is

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reduced. This fact is characteristic of the paramount influence which the speed has upon the formation of corrugations.

It is not impossible that corrugations are produced just before stopping places or upon hills by the effect of violent starting or braking. This produces a dragging of the wheels which everybody has noticed, and the effect of which is evidently the same as that of a vibratory skidding motion.

The question of finding out why it is that the outside rail of curves becomes corrugated and, where there is superelevation on straight lines the lowest rail; does not seem to us to be of interest. It is probable that the wheel on the inside rail of the curve, or upon the superelevated rail, rubs strongly against the lip and is consequently less free to vibrate than the opposite wheel.

To complete this analysis of the replies to the questions, let us note that on all the systems which have given information the length of the corrugations is generally somewhere between 30 and 90 millimetres, that only very exceptionally does it reach 150 to 200 millimetres, and that this length is independent of normal speed. To sum up, the great majority of facts supplied by correspondents goes to confirm the explanation by which we have tried to account for the formation and persistence of rail corrugation; while none of these facts is contrary to that explanation.

In his work, which we have already quoted, Mons. Manant only considers the hammering of the wheels, that is to say, but one of the causes of corrugation, and the one which in our opinion is of secondary importance. He does not explain how the corrugation begins, and does not establish any relation between the shocks of hammering and the length of the corrugations.

Mons. Bacqueyrisse gives a minute description of all the facts which he has observed, and his deductions create a perfectly logical connection between these facts; but his conclusions are very incomplete, for although he attributes corrugation to the skidding, he puts the skidding down wholly to the conical form of the wheels, and thus does not explain the absence of corrugation where the speed does not exceed 10 to 12 miles an hour.

In the very learned paper which Mons. Sieber has published in the *Electrische Kraftbetriebe und Bahnen* he makes a minute analysis, first of all, of skidding (which may be called geometric or cinematic), then of the shocks of the wheels upon the rails; the deductions drawn from this analysis led him to attribute corrugations to the hammering without reference to the effects of skidding. At the end of this paper, it is true, he examines the oscillations of a wheel, either around the axle or else around the vertical axis, but he does this only in order to show that these movements are of a kind to increase the effect of the shocks and, as a result, of the hammering. He does not take into account the friction which is due to vibratory skidding (which may be called dynamic), and of the wearing down which results from it; therefore, while agreeing to the majority of the measures by which he proposes to attenuate the effect of the shocks (that is to say, of the hammering), we think that it would be best to attempt, first of all, to lessen, as far as possible, the effect of friction or skidding, in other words, of wear.

Mons. G. E. Pellisier attributes the formation of corrugations to the irregularity of the pressure of the wheel on the rail and to the crushing of the rail when the maximum pressure exceeds the limit of elasticity, but notices that in railways, where the track is elastic and where the curves are of large radius, the pressure of the wheel upon the rails less frequently attains the limit of elasticity than on the tramways, where the track is rigid and the curves are of small radius. It thus appears that the theory of Mons. Pellisier does not allow either for skidding or the consequent wear. Therefore, in our opinion, it is quite incomplete.

The report for 1912 of the committee of the English Association of Municipal Tramways contains a very minute and complete treatise upon the result of the inquiry which it has carried out, both among its own members and from the results of the experiments which have been made upon various systems. The inquiry has shown that all kinds of subsoil, all types of track, and rolling stock are capable of giving rise to corrugation. The length of the corrugations varies from 50 to 76 millimetres in 85 per cent. of the systems (the longer corrugations appear to be multiples of the first), and there is no relation between the length of the corrugations and the speed of the cars. An interesting piece of information from the tramways of Birmingham-Handsworth has shown that the critical speed at which corrugation commences is somewhere between 11 and 15 kilometres per hour. Experiments have been made upon the following subjects:

(1) Boxing and swinging of cars: These movements were recognised and noted. (2) The skidding of wheels at Leeds: They managed to cause the wheels to mark corrugations on the rails, or rather, spots looking like them, by means of paint, and on rails that had shown no signs of corrugation. The spots appeared in separate lengths and were 75 millimetres apart at a speed of 15 kilometres an hour. (3) Actual distance covered by wheels: A difference was found between the actual distance covered and that due to the circumference of the wheels and the number of revolutions. The committee considered that skidding and slipping set up intense vibrations in both the track and the rolling stock. (4) The difference in diameter of the wheels of a truck (Glasgow) sets up corrugations very quickly; it has been established that conical wheels encourage corrugations. (5) Effects on a new track (Glasgow): The trucks and tires had been carefully checked and were maintained in perfect order, and yet after three months, corrugations appeared and developed normally. (6) Effect of slow-moving vehicle: One of the axles was braked and traces were found of marks like corrugations. In conclusion, the corrugated rails were subjected to a number of tests, and it was found that the crests of the corrugations were harder than the hollows and that cold rolling takes place.

With regard to item (2) it has been already mentioned that the artificial spots were 75 millimetres in length at a speed of 15 kilometres an hour. As the rails were not corrugated, these spots can have been produced only by the vibration of the axles, and what confirms our opinion is that while these spots could not be produced by artificial means, they appeared in different lengths. It is true that the pitch of the corrugations and the speed mentioned correspond to a vibration of the axle with a period of only 2·9; but this figure corresponds with the period-length of the undulatory vibration of the wheel round the axis of the axle under the influence of the elastic reaction of the axle's torque. The committee considered that the difference between the actual and the geometrical distance covered by the wheels, and that due to their circumference, is (item 3) a probable cause of the vibrations; in our opinion it is, on the contrary, the vibrations of the axles which would account for this difference. In the experiments on a new track (5) everything was taken into account: rails, tires, and trucks, except the most important one of all, namely, the ability of the vehicle to generate vibrations in the axles. Finally, in the slow-speed experiment (6) it is evident that the adhesion of the braked axle was sensibly diminished, which would favour such a vibrating displacement that it came under the same conditions as if it had moved faster with the brake off.

On the whole, all the facts brought out by the committee agree with those which we have already pointed out, and confirm our hypothesis. When reading this report and the conclusions they came to, it appears that its authors were led by their discoveries to attribute to the skidding of the wheels an essential rôle in the formation of corrugation, and to recommend fresh experiments, especially on the power and the periods of torsion of the axles and of the wheels and upon the effect of the car-springs on the production of corrugation. From these conclusions it seems to us that they have been working round to what we consider to be the crux of the question, namely, the chattering of the wheels; and that, in fact, they are so near to this conclusion that they must soon arrive at it, if they have not done so already.

Corrugation is caused, it is no longer a matter of doubt, by a number of factors which interact in a manner extremely complex, and these factors vary on different systems. We can not presume to have solved this difficult question by the simple explanation which we have given; but we think that this explanation, while giving the general conditions causing the formation of corrugations, might serve as a guide in the search for useful means whereby corrugations, if not wholly avoided, which, unfortunately, seems impossible, might at least be so diminished as to be innocuous.

To accomplish this the correctness of our conclusions should be thoroughly proved, for although the facts that we have brought forward have convinced us, we cannot flatter ourselves that they will convince every one. There are two methods by which the truth can be established, and they can be used together. The first consists in proceeding to new and more complete experiments; important systems would be in a position to make them, for besides the experiments which we have undertaken and which would be suggested to investigators by their practical knowledge, there would be considerable interest in working upon new tracks, drawing continuous diagrams of the axle vibrations, and this our resources have not allowed us to do. The second means consists in taking measures such as we have described, which are each of a nature to diminish the corrugation, and many of which are within the reach of every undertaking, even the smallest. The experiments would soon show whether these measures were effective, and, consequently, whether the theory from which they have been deduced can be justified. These measures are as follows:

TRACK.

(a) Improvement in the manufacture of rails to remove, or at least to diminish, the variations of structure due to the rolling. The rail question has been completely elucidated in reports presented to previous Congresses; and we cannot do better than refer to the conclusions which have been formulated on the subject of their manufacture.

(b) Construction of tracks upon elastic foundations. This tends to reduce the effect of hammering.

(c) Drainage of the rail seat. It is important that there should be no subsidence of the track, and the infiltration of running water between the rail and foundation is one of the principal factors of track deformation.

CARS.

(*d*) The use of metal tires less durable than that of the rail. The object of this is that the tire should carry a greater part of the effect of the

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vibration which sets up corrugation, and of the hammering which aggravates it. It has not been proved that the cost of the increased wear of such tires is not covered by a reduction in the expense due to rail wear.

(*e*) The adoption of cylindrical tires broad enough always to overhang the rail with very small flange clearance. This design reduces to a minimum the variation in the diameter of a wheel, and consequently the difference in the length of the periphery of two wheels on the same axle, in whatever position they may be.

(*f*) A study of the journal and oil boxes, and of the suspension of the trucks, with a view to diminish the vibratory movement of the axle in the horn plates. Any suspension, whatever it may be, exerts a horizontal elastic reaction upon the grease box when this is shifted parallel to the rail in the horn plates; to this elastic reaction of the suspension is added the elastic reaction of the horn plate itself against the grease box when that comes in contact with it. It is possible to investigate, if not theoretically at least experimentally, the arrangement which would give the greatest stability to the axle.

(*g*) Increase in the wheel base of cars with parallel axles. By this modification, which is advantageous for other reasons, the effect of hunting upon the axle would be diminished as well as the galloping which by variation of the load on the axles sets up vibration.

(*h*) A special study of bogie trucks with one or two axles. An experimental study of the movements of the axles and of the trucks in bogie cars would indicate on what lines bogies ought to be constructed in order to diminish the oscillation of the axles.

ADVANTAGES AND DISADVANTAGES OF THE VARIOUS METHODS OF TRANSFORMING HIGH-TENSION ALTERNATING CURRENT INTO CONTINUOUS CURRENT.*

By James Dalrymple
(General Manager)
and E. T. Goslin
(Chief Electrical Engineer, Glasgow Corporation Tramways).

The above question deals with the type of converting machinery best suited for transforming high-tension alternating into continuous current. In dealing with the mass of information contained in the replies received, I have endeavoured to keep as closely as possible to the object of the main question, feeling that it would be quite impossible to attempt to report on the many side issues that have evolved from the questions asked and the replies received.

The periodicity adopted by the municipalities and power supply companies some years ago evidently influenced their selection of a particular type of converting machinery, inasmuch as, at the time when many of these concerns were in the market for converting plant, makers of rotaries were doubtful as to the performance of these machines at the higher frequencies. Attention is, therefore, directed to the periodicity of the generating station controlling the supply to the converting machinery of the various authorities answering the queries. The periodicity of supply is shown in the following tabulation:

Generating Stations Supplying Current for—

Lighting, Power, and Traction.		Lighting and Power only		Traction only.	
No. of Stations.	Periodicity.	No. of Stations.	Periodicity.	No. of Stations.	Periodicity.
1	100	2	25	3	50
16	50			1	42
1	50 & 25			6	25
1	49				
1	48				
1	42				
1	25				

It should be noted that in one case at least the periodicity of the municipality supplying light and power only (no traction) was fixed by the frequency of the supply already existing in the city for traction purposes and with which system it was intended to run in parallel.

From the returns it is found that many municipalities and supply companies having started with one class, have kept to that particular type of converting machinery. This is brought out in the following table:

	Numbers.
Using rotaries alone	13
Using synchronous motor generators alone	8
Using asynchronous motor generators alone	4
Using cascade converters and synchronous motor generators	2
Using rotaries, synchronous, and asynchronous motor generators	2
Using rotaries and synchronous motor generators ..	1
Using rotaries and asynchronous motor generators ..	2
Using cascade converters and asynchronous motor generators	1
Using all above types	1

The reasons given for the choice of the particular converting plant in use are many, and in some cases are directly opposed to one another; as when, for example, one selects rotary converters because of their lower cost, and another chooses asynchronous motor generators for the same reason. It is, however, evident from the returns that, as has already been stated, motor generators were selected in many cases in preference to rotary converters owing to the fact that at the time the converting machinery was purchased a selection could really only be made between synchronous and asynchronous motor generators; since rotary converters (suitable for 50-period circuits) and cascade converters were in the experimental stage. Now-a-days, of course, the old objection to the use of rotary converters on 50-period circuits has passed, and a large number of these 50-period machines are running and giving every satisfaction, and the cascade converter has been developed. Among other reasons advanced for the choice of motor generators is the independence of the direct-current side from the alternating-current supply, and the absence of static transformers. Very little is said in favour of asynchronous as compared with synchronous motor generators, and, indeed, judging from the replies received the day of the asynchronous motor generator seems to have passed; mainly due to the bad effect on the power factor caused by induction machines. As regards synchronous motor generators the advantages claimed consist in their adaptability to act as generators when driven from either side, as well as the other good points previously mentioned, but the principal reason given for the choice of this type of machine is the better power factor it gives to the supply circuit.

Cascade converters appear to have made but little headway. In one or two cases, however, they are preferred to rotaries owing to the absence of static transformers, the less floor space occupied, and the greater elasticity of the machine.

As regards the time taken to start up each type, the replies show an extraordinary variation for the same class of machine—from half a minute to 10 minutes for rotaries and synchronous motor generators, and from 45 seconds to 4 minutes for asynchronous machines. Generally speaking, however, it may be stated that the time required to start up each type of converter is, approximately, the same—from 1 to 2 minutes.

No one type of converter, judging from the replies received, can, in any way, be put forward as immune from flashing over on the direct-current side on sudden heavy overloads and short circuits, but under the same conditions the synchronous type of motor generator appears to give more trouble on the alternating-current side through falling out of step, than any of the other three.

Turning to the replies received as to improvements made, or desirable to be made, the suggestions are:

1.—All rotaries to be self-synchronising.

2.—Oscillating apparatus, for equalising and reducing commutator and slip ring wear, to be fixed to rotors.

3.—Large rotaries to be substituted for motor generators.

4.—Substitution of plain bearings for ball and roller bearings.

5.—Substitution of synchronous for asynchronous motor generators.

One other point only strikes me as likely to be of general interest to the members of the Union—that is, all parties recommend that for a purely traction load, supplied at the lower frequencies of, say, between 20 and 30 periods, the rotary converter is the most satisfactory machine.

The advantages and disadvantages of the respective machines mentioned in this report may be summed up as follows:

MOTOR GENERATORS.

Asynchronous Motor Generator Sets.

The advantages derived from the use of these sets are:

1.—Extreme simplicity of starting and operation.

2. The range in voltage that can be obtained on the direct-current side is from 0 up to the maximum voltage of the set, providing same is separately excited, and even without separate excitation a range of 30 per cent. can easily be obtained. This long range is particularly useful for charging batteries or electrolytic work, and can be obtained without variation of the power factor on the alternating-current side of the set.

The disadvantages are:

1.—Low efficiency and relatively low power factor, which is always lagging.

2.—High tension on the stator winding.

Synchronous Motor Generators.

Advantages:

1.—Simplicity of operation.

2.—Large range (same as the asynchronous machine) of direct-current voltage possible without affecting the power factor of the alternating-current side.

* A paper prepared for the Budapest Congress of the International Tramways Union, which was abandoned owing to the European War.

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3.—Large variation of power factor can be made on the alternating-current side without affecting the direct-current end, and so such sets are useful where it is sometimes required to draw heavy leading current and at other times unity power factor.

4.—Admirably suited for reversible operation, that is where the same output is required either alternating current to direct current or direct current to alternating current.

Disadvantages:

1.—Low efficiency.
2.—High initial cost.
3.—High tension on the stator.
4.—Not so simple to start as asynchronous motor generators.

Three methods of starting available:

(a) Self-starting and self-synchronising.
(b) Direct-current starting.
(c) Induction motor starting.

ROTARY CONVERTERS.

Advantages:

1.—High efficiency.
2.—High overload capacity.
3.—Low temperature rise.
4.—High tension on transformer windings instead of stator.
5.—Low initial cost.
6.—Under normal conditions of operation they can easily be arranged to run on unity or leading power factors.

Disadvantages:

1.—Direct-current voltage not independent of alternating current. (This can, to some extent, be taken care of by various methods of control as mentioned below.)
2.—If required to run direct current to alternating current will require booster and exciter.
3.—Starting not so simple as asynchronous motor generator sets.

Methods of Voltage Control:

1.—Reactance control.
2.—Booster control.
3.—Induction regulator control.
4.—Split pole control.

Starting of Rotary Converters:

The following methods are available:

1.—Self-starting and self-synchronising.
2.—Direct-current starting with synchronising.
3.—Induction motor starting with synchronising.
4.—Induction motor starting with self-synchronising.

The first method is more applicable to converters up to approximately 500 KW. capacity, and the starting current can be kept below, approximately, 40 per cent. of full load current.

The second method is applicable to all sizes of converters, and will take about 10 per cent. of full load current from the direct-current side. This method of starting is simple and of the lowest cost, provided the necessary direct current for starting can be obtained from a battery or some other source.

The third method is applicable to all sizes of converters, but particularly to sets of 500 KW. and above. Squirrel cage induction motors are invariably used, and are specially designed so as to take not more than 30 per cent. of full load current from the line.

The fourth method is applicable to 500 KW. and above, and has the advantage of the third method with the further advantage that it is self-synchronising.

It is not convenient to use induction motor starting for fewer number of poles on the rotary than six, *i.e.*, 1,000 revolutions per minute sets for 50 cycle, and 500 revolutions per minute sets for 25 cycle.

MOTOR CONVERTERS.

This machine is electrically half a motor generator and half a rotary, and consequently its characteristics are somewhere between those of a rotary and those of a motor generator.

The efficiency and overload capacity are lower than a rotary, but greater than a motor generator.

The starting is not so simple as an asynchronous motor generator set, and about the same as starting rotary converters.

Advantages:

1.—Does not reverse its polarity.
2.—Possesses a good voltage regulation.
3.—Requires small floor space.

Disadvantages:

1.—They are not so simple electrically as a motor generator or rotary converter.
2.—Not so accessible as a motor generator or rotary converter, especially if they are constructed with two bearings.
3.—Liability of the machine to attain double speed if the direct-current field be broken.
4.—Not so suitable for 25-cycle circuit.
5.—High tension on stator winding.
6.—Where large ranges of direct-current voltage are required it is advisable to install a synchronous booster to control the power factor, as direct-current voltage can only be varied with corresponding variation in power factor similarly to conditions existing on a rotary.

Before closing my report there is a matter that perhaps may be of more interest to the members of the Union than the abstracts I have already given.

Since my replies in connection with the rotary converters in use on the Glasgow Corporation Tramways were returned to our esteemed secretary, further troubles have occurred, due to breakdown of insulation of the rotary armatures. These rotaries have mostly been in service since the year 1901.

On examination of the broken down armatures, it was found that the insulation of the windings had become very brittle and was beginning to flake off. An inspection of other than the broken down armatures was also carried out, when it was found that the insulation was in the same bad state, so it would appear that some 14 years is the limit of life of the armature insulation. It is intended to gradually rewind the whole of the rotary armatures with a more "open" and up-to-date winding, and at the same time take the opportunity of making the machines self-synchronising (with induction starting motor winding in series with the rotary winding through the slip-rings) and fixing oscillating apparatus to the rotary armature.

THE NORTHAMPTON TRAMWAYS MANAGER.

Mr. J. Gottschalk, general manager of the Northampton Corporation Tramways, who is a native of Germany, made the following statement at a special meeting of the Tramways Committee:

"As various statements have been made respecting my loyalty, I think it is due to the committee that I should put my position before them.

Among the various accusations, it is stated that I attended the Army manœuvres last year, that I have invested my money abroad, that I have introduced foreign officers and purchased horses for foreign armies. I beg to give all these statements my absolute denial. All the years I have resided in this country, I have never committed a disloyal action to the country of my adoption and, come what may, I never shall. I came to this country before I was 18 years of age, and have resided here ever since. My wife and children are English and one of my sons has served in the British Army.

As regards naturalisation, I confess now that I have made a mistake but I never dreamed with our present civilisation such a catastrophe could possibly occur. I may here state that for 20 years past I have lost my German nationality.

I desire to put myself unreservedly in the hands of the committee, and to express my feeling of gratitude and appreciation at my reception and treatment in the past, and the encouragement and consideration I have always received at their hands.

In conclusion, I deeply deplore the circumstances which have necessitated a statement of this nature, and I am only too anxious to prove in any way I can, that I am, and always have been, loyal to England and her people."

Councillor T. D. Lewis, chairman of the committee, said that they would always have every confidence in Mr. Gottschalk. The employees had always recognised his energy and sense of fairness, and had received nothing but kindness from him. Mr. Gottschalk had lived for 28 years in Northampton, holding a responsible position, and he trusted that Mr. Gottschalk's statement would allay any fears that had been aroused.

Mr. Gottschalk, since the meeting reported above, has received naturalisation papers, and has thus become a British citizen. We need only add that he is known and respected by a large number of his colleagues throughout the country, and of his loyalty there is not the faintest shadow of a doubt.

GERMAN EXPORTS OF RAILS.

The Board of Trade, in pursuance of their plan for helping British manufacturers to capture German export trade, continue the issue of bulletins giving particulars of German exports. One issued recently relates to railway materials of iron and steel (except rolling stock and wheels, tyres and axles). The total value of railway materials of the kinds included exported from Germany during 1912 was £4,531,200. The largest item was railway and tramway rails, the value of which was £2,900,600. By way of comparison the value of corresponding railway materials exported from the United Kingdom during 1913 was £5,189,600. Out of this sum, £3,457,800 represented rails for steam and electric railways, and conductor rails for electric traction, and £156,500 was the value of tramway rails with grooved heads. Germany's principal markets for railway material were the Dutch East Indies, Turkey, Argentina, Sweden, Switzerland, Netherlands, Chile, Brazil, United Kingdom, Japan, and Denmark.

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RECRUITING CAR AT CROYDON.

We have received from the manager of Croydon Corporation Tramways, Mr. T. B. Goodyer, a photograph of a rail water car decorated

Recruiting Car—Croydon Tramways.

with a view to assisting recruiting, which is here reproduced. At night the car is illuminated with over 150 32-c.p. lamps, and it has attracted much attention.

LIVERPOOL'S DECORATED CAR AIDS RECRUITING.

The Liverpool Corporation Tramways made an interesting display with their illuminated car on the occasion of the patriotic demonstration at the Tournament Hall, Edge Lane, on the night of Monday, September 21, when, under the chairmanship of Alderman Salvidge, J.P., the First Lord of the Admiralty, the Right Hon. Winston Churchill, M.P., made his memorable speech, supported by Mr. F. E. Smith, K.C. M.P., and Mr. T. P. O'Connor, M.P., and the leading citizens.

The car, which had been specially prepared for the occasion, in addition to the usual artistic lamp illumination designs, was embellished by illuminated busts of their majesties the King and Queen at either end, whilst along the top rails representations symbolical of the various Colonies were displayed, with illuminated glass panels underneath bearing the inscription, "United we stand," and "God save the King." On the side windows of the car were displayed large coloured transparencies of Field Marshalls Lord Kitchener and Sir John French, and Admiral Sir John Jellicoe, coupled with an appeal for recruits.

The car, conveying the tramways band, traversed the central area and suburbs of the city, and subsequently proceeded to the Tournament Hall, where it served a useful purpose, the band entertaining with patriotic music a gathering of 20,000 people who had been unable to obtain admission to the hall, recruiting officers meanwhile being actively engaged in their work of enlistment.

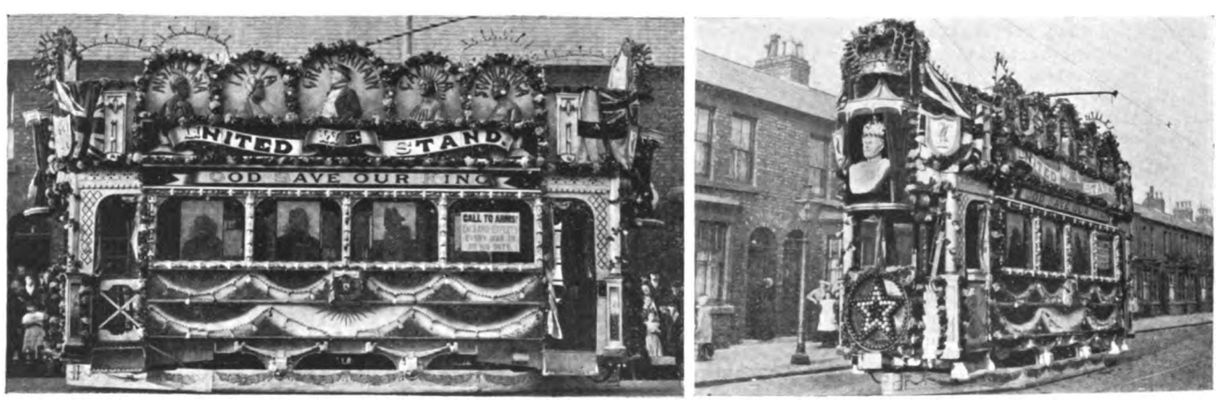
The turnout met with a hearty reception throughout, and the tramways department are to be congratulated upon the result of their effort to second the worthy cause of this historic demonstration.

THE NEW TRIUMPH SEAT.

A new seat with the above title was brought out and put on the market a few months ago, and since its appearance has met with much success, having been adopted by several large tramways after a most careful inspection. In exterior appearance the seat is similar to the standard type of Walkover seat manufactured by the United Electric Car Company, Limited, Preston. The mechanism for operating the seat back is, however, different, and is as follows: The seat is carried on a tilter with angle corner stops on the upper side in place of the usual dowel pins, and this enables the seat to be easily fitted in position, even in the dark. On the bottom of tilter is arranged a rack, which engages a quadrant carried on a stud; the quadrant is wide enough to engage with another quadrant which is secured on a solid steel shaft.

The Triumph Seat.

A similar quadrant is fixed on the other end of the shaft and operates a similar series of mechanism, ensuring the seat travelling in a parallel direction. The back is carried on two short operating levers each side, one of these levers being fixed to the solid steel shaft, while the other one is carried loose on stud, which also carries quadrant. All the castings are made of the finest quality malleable cast iron, and are set and drilled to jig so that all parts are interchangeable. The seats can be supplied in any type to suit customers' requirements, and upholstered in any quality of material.



Liverpool's Decorated Car for Recruiting.

The company has received orders for several thousands of these seats, and are now completing orders of between six and seven thousand. The invention is that of J. E. Anger, manager of the United Electric Car Company, Limited, Preston, and patents have been taken out in England and abroad.

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CORRESPONDENCE.

The British Thomson-Houston Company.

To the Editor of The Tramway and Railway World.

Dear Sir, I notice in some of the electrical papers various letters which enquire into the composition of the British Thomson-Houston Company, Limited. Although the files at Somerset House tell the whole story, few take the trouble to make an examination, and, therefore, the following may be of interest, and I would appreciate it if you will publish the information in full:

Our capital consists of 80,000 shares of the par value of £10 each and £186,215 in debentures.

Our shares are held as follows:

44	English shareholders	holding	10,458 shares.
11	French ,, ...	,,	3,109 ,,
9	American ,, ...	,,	64,876 ,,
1	Belgian shareholder	,,	83 ,,
1	German ,, resident in Cologne ...	,,	333 ,,
1	,, ,, ,, England ...	,,	1,141 ,,
	Total		80,000

Neither of these last two shareholders, so far as we know, are in any way connected with electrical manufacturing companies, either here or in Germany.

We have 106 debenture holders, all of them resident in England, and all English, with the exception of one French lady, who holds £2,000 par value, and she resides in Folkestone. We have not a single German in our employ, or in any way connected with the company.

Our active board consists of the following:

J. F. Nauheim, who represents the shares held by Lord Rothschild in our company. He has resided here most of his life, and has been naturalised between 30 and 40 years.
George Franklin, of Sheffield and London, who was at one time Lord Mayor of Sheffield, and who was chairman of the National Telephone Company.
Owen H. Smith, who came on originally to represent our debenture holders. He is one of "The Proprietors of Hay's Wharf, Limited."
F. Fraser, a Scotsman, who is also our secretary.
W. C. Lusk, manager of our commercial departments.
H. N. Sporborg, our chief engineer; and
Myself, the managing director.

We (the latter three) are American born, and have been here from 10 to 12 years.

The other members of our board are three Americans residing in New York, who represent large shareholders, and one of them for many years resided in London—namely, C. A. Coffin, E. W. Rice, junr., E. A. Carolan.

The two former are chairman and president respectively of the General Electric Company of New York, the patents of this company and its predecessor, the Thomson-Houston Company, forming the original basis of our company.

C. Burrell, an Englishman, who has spent most of his life in France, now living in Paris.
E. Thurnauer, who is an American citizen, also living in France.

These two are managers of the Compagnie Française pour l'Exploit des procédés Thomson-Houston, and represent on our board the French shareholders.

The total number of our employees is about 5,600, a large number of whom are, of course, young women in the lamp factory. Our factories are at Rugby, Coventry, and Willesden.

So far about 900 of our employees have joined the colours, which is over 50 per cent. of those who are eligible, and all who have joined, both married and single, receive half wages, or salaries, while they are away, and their places will be kept open for them until their return, to the fullest possible extent. I might also add that no changes have been made in the salaries of those who remain in the company's employ.

Faithfully yours,

H. C. Levis,
Managing Director.

The British Thomson-Houston Company, Ltd.,
83, Cannon Street, London, E.C.
September 14, 1914.

Edinburgh Tramway Affairs.—The Tramway Committee of Edinburgh Town Council have recently had under consideration a motion by Councillors Deas and Graham to consider the existing position of affairs and the present and prospective needs of the city with regard to tramways, and in particular with regard to the taking over and working by the Corporation of the existing tramways; additional routes and extensions desirable now and in the near future; the method of traction to be used, having in view the amenity of the city, the existing system, and the desirability of through working with Leith; and the extended use or otherwise of motor 'buses in connection with the transport service of the city. Opinions on the subject were divided, but ultimately it was decided to bring the matter, along with the question as to arrangements with the lessees, before a special meeting.

PERSONAL.

Mr. E. Jordan has been appointed assistant electrical engineer of Northampton Corporation.

Mr. W. T. D. Grundy, of Morecambe, has been appointed general manager of the Derwent Valley Light Railway.

Mr. Lloyd Davis has been appointed city engineer of Cape Town. Mr. Davis was formerly city engineer of Alexandria.

Mr. M. N. Henderson has been appointed chief mechanical engineer to the Australian Commonwealth railways.

Mr. Councillor Pridmore, chairman of the Coventry Corporation Tramways Committee, has been invited to become Mayor of the city.

Mr. R. S. Tresilian, the well-known secretary of the Dublin United tramways, has been appointed a Justice of the Peace for the County of Dublin.

Mr. A. Shelton has been appointed manager of the Manchester branch of Messrs. Berry, Skinner, and Company, in succession to the late Mr. R. W. Edge.

Mr. Henry M. Sayers will deliver a course of 20 lectures on "The Economics of Electric Traction" at the London School of Economics, beginning on Wednesday, October 14.

Mr. B. H. Antill, director and manager of Siemens Brothers Dynamo Works, Limited, has been elected a member of the Council of the B.E.A.M.A., in the place of Mr. C. Koettgen.

Mr. Philip A. Lange, managing director of the British Westinghouse Company, Limited, has changed his name to Lang. Mr. Lang is of American birth, but has been a naturalised citizen for many years.

Mr. Cecil Barber, who has represented the "Fram" interest of Mr. Conway Jenkin, has now been appointed sales manager of the General Vehicle Company, Limited, Imperial House, Kingsway, London, W.C.

Mr. H. E. Yerbury, resident tramways engineer of Sheffield, has been appointed by the Tramways and Electricity Committee to the position of deputy general manager and engineer of the electric supply department.

Mr. C. Koettgen has tendered his resignation as a director and managing director of Siemens Brothers Dynamo Works Company. His resignation has been accepted, and Mr. Koettgen has no further connection with the company.

Mr. L. C. F. Bellamy, borough electrical engineer and tramways manager of Ilkeston, has been granted leave of absence by the Council to enrol in the Divisional Engineer Units and Signal Company of the Royal Naval Division, and has gone into camp at Martin Hill, Kent.

Mr. E. E. Sharp has joined the board of the Jackson Electric Stove Company, Limited, 3, Blandford Street, W., and will act with Mr. Williams in the direction of the business. It will not affect his connection with Messrs. Chamberlain and Hookham's meters and Venner's time switch business.

Mr. William Allen Carter, C.E., Edinburgh, the arbiter appointed by the Board of Trade in connection with the arbitration between the Town Council and the Broughty Ferry Tramway Company, regarding the taking over of a part of the line between the old Dundee boundary and West Ferry, was in Dundee on September 16, and inspected the part of the line in question.

Mr. W. Vincent Edwards has been appointed engineer and general manager of the Hastings and District Electric Tramways Company, Limited, in succession to the late Mr. T. B. Holliday. Mr. Edwards was one of the first to join the electric traction branch of Messrs. Dick, Kerr and Company, and saw a good deal of service with them in various English and Continental towns. Subsequently he was in their London office for several years before going to the Hastings Company, of which he has for some time been deputy manager.

Mr. W. J. Pickering has been elected a director of Hadfield's, Limited. Mr. Pickering was appointed to a position on the staff of the company 23 years ago, and has had an extensive experience in various positions in the company. Some years ago he established the South African office of the company at Johannesburg, and on the introduction of electric tramways he was selected to undertake the organisation and control of this department. As manager of the traction department he has travelled extensively, and is widely known among railway and tramway engineers in this country and throughout Europe. His many friends will be pleased to learn of the well-deserved recognition which he has received from Sir Robert Hadfield and the directors of the company by his appointment to a seat on the board.

Proposed Tramway at San Juan.—*The Review of the River Plate* reports that the Government of the province of San Juan has approved the plans of the constructing syndicate for a tramway system connecting the city of San Juan with the surrounding suburbs.

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NEW CONTRACTS AND ORDERS.

Ayr Corporation have placed an order with Richardsons, Westgarth, and Company for a steam turbine generator at £4,940.

Siemens Brothers Dynamo Works, Limited, have received an order from H.M. Office of Works for 12 months' supply of "Wotan" lamps.

Sydney Electricity Committee have accepted the tender of the British Insulated and Helsby Cables, Limited, for feeder cables at £10,638.

Messrs. Davis, Lowe, and Sons, Limited, have an order from Manchester Tramways Committee for cast-iron pipes for heating purposes.

St. Helens Cable and Rubber Company have received an order from Warrington Electricity and Tramways Committee for cables at £1,657.

Messrs. Charles Macintosh and Company, Limited, have received an order from Bacup Electricity and Tramways Committee for distributing mains.

Babcock and Wilcox, Limited, are supplying a coal weigher, conveyor, and boiler house bunkers and jib crane to the Walsall Electricity Committee.

The British Insulated and Helsby Cables, Limited, have received an order from Edinburgh, in substitution of an order recently placed with a German firm.

York Electricity and Tramways Committee recommend acceptance of the tender by G. Robson and Company, Sheffield, for the supply of a rail grinder at £65.

The Yorkshire Commercial Motor Company, Limited, of Leeds, have received an order from the India Office for the supply of a steam wagon for the stores department.

Willans and Robinson, Limited, have an order from the Wolverhampton Town Council for reconstructing the 2,000-KW. turbo-alternator at the tramway generating station.

Kaye and Sons, Limited, Leeds, have received a War Office order for the supply of 3,000 patent seamless oil cans. Over 7,000 of the same type of can have been delivered to the Navy.

Keighley Town Council have accepted the tender of the Cedes Electric Traction Company for two railless trolley vehicles at £806 10s. each, and for a second-hand trolley vehicle at £400.

Prahran and Malvern Tramways Trust have accepted the tender of the Meadowbank Manufacturing Company for 20 car bodies of the combination type, the price to be £527 each.

Edison and Swan United Electric Light Company have received an order from H.M. Office of Works for 12 months' supply of "Royal Ediswan" wire lamps, carbon and special lamps.

The Daimler Company, Limited, Coventry, have received an order from Manchester Tramways Committee for six motor omnibus chassis to replace those which have been commandeered for army service.

Walsall Tramways Committee have accepted the tender of the Daimler Company, Limited, for four double-deck and two single-deck motor omnibuses, at a total cost of £4,595. Six sets of tyres are to be purchased direct from the Dunlop Company at £321 7s.

Launceston (Tasmania) City Council have placed an order with Messrs. H. Jones and Company, of Hobart, for the following tramway rails and accessories: 240 tons No. 1 B.S.S. 90-lb. rails, £7 12s. 6d. per ton; 30 tons No. 1 C.S. 96-lb. rails, £8 2s. 6d. per ton; 350 pairs fishplates, 4s. 7½d. per pair; 1,832 fish bolts, £1 8s. 2½d. per 100.

Ilford District Council have accepted the tender of the agents for the North Eastern Steel Company, Messrs. A. McBean and Son, at £8 2s. 6d. per ton for rails and £9 7s. 6d. for fish plates. The tender of Messrs. Walter Scott and Company was £8 10s. for rails and £10 5s. for fish plates. Mr. Sandberg since the acceptance of the tender, has under the special circumstances reduced his usual fee on the rails to one-half.

Sunderland Corporation have placed an order for two 1,500-KW. converters with the General Electric Company, Limited, of Witton. Tenders were also received from the following firms: Bruce Peebles and Company, British Westinghouse Company, British Thomson-Houston Company, Dick, Kerr and Company, Electric Construction Company, Mather and Platt, Siemens Brothers Dynamo Works, and Vickers, Limited.

Anger Brake Adjusters.—The Anger Manufacturing and Supply Company, of Bank Chambers, Preston, have received an order to equip all of the 180 trucks now being made by the United Electric Car Company for the Anglo-Argentine Tramways of Buenos Aires with the latest improved type of the Anger brake adjuster. They have also been instructed by the Oldham Corporation Tramways to equip all the new trucks, now being made for them by the same company, with the brake adjusters. In addition they have received duplicate orders from the Hong-Kong tramways for 50 more sets, and from Johannesburg, Port Elizabeth, and Cape Town. An order has also been received to equip with Anger brake adjusters the 25 new trucks just ordered by the Societe Commercial Tramways of Monte Video, Uruguay.

Sydney Municipal Council have accepted the following tenders: Supply and erection of coal conveyor at power-house, Babcock and Wilcox, Limited, £3,795 10s.; 33,000-volt outdoor transformers and switch gear, Australian General Electric Company, £4,287; four 2,000 k.v.a. 33,000/5,000-volt three-phase transformers for Homebusch abbatoir sub-station, Siemens Brothers Dynamo Works, Limited, £5,200; switch gear of 2,000-KW. capacity for refrigerating plant at abbatoirs, Australian General Electric Company, £2,548 10s. The Council have also placed an order for a 5,000-KW. turbo-alternator and condensing plant with Messrs. Willans and Robinson, Limited, in substitution for an order previously placed with a German firm. The machine will consist of a standard Willans "disc and drum" turbine, coupled to a Dick-Kerr alternator, the turbine exhausting into a Willans surface-condensing plant with rotary air pumps. The municipality have given Messrs. Willans and Robinson terms of payment embodying monthly instalments, as the work proceeds, up to a total of 80 per cent. of the value of the contract on shipment. Messrs. Preece, Cardew, and Snell are acting as engineers in this country for the Corporation.

FINANCIAL REPORTS AND MEETINGS.

Aberdeen Suburban Tramways, Limited.—Mr. James Mearns, chairman, presiding at the half-yearly meeting of the shareholders, said that the company continued to make satisfactory progress. They were now finding some advantage in the reduction of the price of electrical energy which they purchase from the Town Council. The renewal and depreciation fund now amounts to £14,000, or nearly one half of the paid-up capital of the company. A dividend at the rate of 2½ per cent. was declared.

Puebla Tramway, Light, and Power Company.—The net profits in Mexico for the year 1913 amounted to $736,952 (Mex.), as compared with $753,635 for 1912 and $655,641 for 1911. Reckoning the earnings at the parity of exchange, there is a balance, after meeting all expenses, bond interest, and first mortgage bond sinking fund, of £1,106, but, owing to the heavy loss in exchange, which amounted to £19,456, the net result is a debit balance of £18,350, which amount has been carried to the balance-sheet. The construction of the power plant at Tuxpango is now completed, and 17,000 H.P. is now available therefrom.

Unlied Electric Car Company.—The report for the year ended June 30, 1914, shows that after paying debenture interest, amounting to £641, and charging £6,184 for depreciation, including £4,500 added to the reserve, the profit for the year amounted to £16,095. Including £1,558 brought forward from last year, there was thus a total balance available of £17,654. Preference dividends for the year require £6,000, and a dividend of 5 per cent. was paid on the ordinary shares, £2,000 was placed to the general reserve, leaving £2,154 to be carried forward. The balance of the debenture stock was redeemed on January 1, 1914. Mr. George Richardson and Mr. John Kerr retired from the board during the year, and Mr. John Greenwood was elected a director.

Bolckow, Vaughan and Company.—The report for the year ended June 30 last shows that the trading profits were £246,464, and £137,038 was brought forward. The expenditure on plant has been £154,046, of which £132,411 has been charged to capital, and it is proposed to provide the remaining £21,635 out of profits. Debenture interest absorbs £27,947, and a final dividend of 3½ per cent. is recommended on the ordinary shares, making 6 per cent., subject to income tax, for the 12 months, and carrying forward £145,538. The board proposed to pay one-half of the final dividend on October 1 and the remainder at their discretion. A year ago the trading profits were £525,597 and the dividend was 10 per cent. In 1911-12, however, the profits were only £209,893 and the dividend was 5 per cent.

Sheffield Corporation Tramways.—The report for the year ended March 25 last shows that the total income from the tramways was £389,676. The working expenses were £232,761, equal to 6·288d. per car-mile, an increase of ·112d. compared with the previous year, chiefly accounted for by an increase in the cost of coal, permanent way repairs, and rates. The net revenue was £156,915, and after deducting interest, sinking fund, income tax, etc., and adding interest on investments, there is a net credit balance of £77,607. Out of this sum £30,123 goes to renewals fund, £7,669 to street improvements, £2,000 to special purpose fund, and £7,234 to accumulated surplus fund; the remaining amount of £30,582 is transferred to the general district rate. The expenditure on renewals of permanent way was £25,255. The number of car-miles run was 8,883,576, and the number of passengers was 104,851,408, compared with 96,330,242 in the previous year.

(Continued on page 279.)

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

TABLE I.—TOWNS WITH COMBINED GENERATING STATION FOR TRACTION AND LICHTING PURPOSES.

Name.	Year Ended.	Electric Traction Inaugurated.	System.	Line open (single track). Mls. Chs.	Borrowing Powers.	Borrowing Powers Exercised.	Unexhausted Borrowing Powers.	Total Capital Expenditure.	Capital Expenditure per Mile of Single Track.	Loans Outstanding.	Loans Repaid and Sinking Fund.	Depreciation, Renewal and Reserve Funds.	Gross Receipts. Traffic.	Other.	Total.
Aberdeen	*May 31, 1914	Dec., 1899	E.	27 72	415,000	357,191	57,809	357,191	12,802	186,885	246,163	169,987	84,276	991	**85,267**
Accrington	*Mar. 31, 1914	Aug., 1907	,,	10 53	181,925	133,875	48,050	134,734	12,636	113,870	20,864	16,581	29,843	350	**30,193**
Ashton-u-Lyne	Mar. 25, 1913	Aug., 1902	,,	8 15	130,070	108,099	21,971	108,099	13,203	79,589	28,510	2,150	22,206	285	**22,491**
Ayr	May 15, 1913	Sept., 1901	,,	7 49	...	...	...	85,445	11,224	78,933	18,044	14,918	15,626	670	**16,296**
Birmingham	*Mar. 31, 1914	Jan., 1904	,,	114 44	2,577,611	2,352,104	225,507	2,334,437	20,379	1,913,559	438,545	186,154	628,016	7,455	**635,471**
Blackburn	*Mar. 25, 1914	Mar., 1899	,,	24 63	408,174	342,474	65,700	335,735	13,544	248,578	182,557	2,146	68,192	3,147	**71,339**
Blackpool	*Mar. 31, 1914	June, 1899	,,	(p)21 33	453,798	310,994	142,804	310,994	14,524	310,994	126,036	21,660	84,034	763	**84,797**
Bolton	*Mar. 31, 1914	Dec., 1899	,,	47 19	551,092	551,092	...	566,395	11,961	399,417	178,850	50,819	142,504	1,270	**143,774**
Bradford	*Mar. 31, 1914	July, 1898	,,	(h)106 29	1,280,788	1,061,113	219,675	1,040,118	9,779	653,504	420,844	82,898	298,525	18,608	**317,133**
Brighton	*Mar. 31, 1914	Nov., 1901	,,	17 15	378,093	277,905	100,188	278,467	16,202	219,972	62,273	5,841	54,600	2,238	**56,838**
Burnley	*Mar. 31, 1914	Dec., 1901	,,	22 18	388,052	325,999	62,053	232,501	10,461	179,136	64,381	39,684	88,050	266	**88,316**
Burton-on-Trent	*Mar. 31, 1914	Aug., 1903	,,	10 50	108,632	104,562	4,070	106,275	10,121	49,239	55,323	10,134	15,010	1,497	**16,507**
Bury	*Mar. 31, 1914	June, 1903	,,	21 2 (b)13 21	407,800	284,745	123,055	286,989	13,650	255,455	49,013	(l)29,518	69,745	335	**70,080**
Chester	Mar. 25, 1913	April, 1903	,,	6 35	92,991	82,380	10,611	82,934	12,883	69,727	12,785	2,968	12,272	458	**12,730**
Chesterfield	Mar. 31, 1913	Dec., 1904	,,	5 8	95,000	70,500	24,500	69,575	13,642	58,510	11,990	5,031	12,220	474	**12,694**
Colchester	*Mar. 31, 1914	July, 1904	,,	7 75	70,748	69,555	1,193	69,401	8,743	50,816	19,483	Nil.	10,390	509	**10,899**
Croydon	*Mar. 31, 1914	(q) Sept., 1901	,,	17 50	287,689	287,689	Nil	284,847	16,162	229,300	96,719	42,352	84,926	2,100	**87,026**
Darlington	Mar. 31, 1913	June, 1904	,,	8 71	107,500	76,263	31,237	76,322	8,587	56,888	19,434	5,726	11,842	334	**12,176**
Darwen	Mar. 31, 1913	Oct., 1900	,,	7 13	93,400	86,300	7,100	86,300	12,048	57,330	28,280	7,450	14,244	1,176	**15,420**
Derby	*Mar. 31, 1914	July, 1904	E. H.	22 20	... ...	... ...	... ...	245,332 ...	11,026 ...	177,676 ...	67,656 ...	(l)32,356 ...	E51,126 H 429	1,048 19	**52,174 448**
Doncaster	Mar. 31, 1913	June, 1902	E.	12 42	...	...	...	99,172	7,918	80,400	14,741	780	19,928	334	**20,262**
Dundee	May 15, 1913	July, 1900	,,	27 38	(f)	345,450	...	352,663	12,835	262,038	83,411	71,823	63,395	1,650	**65,045**
East Ham	*Mar. 31, 1914	June, 1901	,,	14 5	190,643	190,242	401	191,654	13,127	140,457	65,478	3,453	54,079	836	**54,915**
Exeter	Mar. 31, 1913	April, 1905	,,	7 0	106,000	86,111	19,889	86,111	12,301	69,376	17,209	5,915	16,748	Nil	**16,748**
Gloucester	*Mar 31, 1914	April, 1904	,,	15 1	191,000	144,333	46,667	147,783	9,846	107,275	20,592	1,000	16,829	1,188	**18,017**
Halifax	*Mar. 31, 1914	June, 1898	,,	55 39	449,263	417,466	31,797	419,335	7,557	297,327	119,433	31,745	108,617	1,033	**109,650**
Ilford	Mar. 31, 1913	Mar., 1903	,,	11 28	149,633	149,633	Nil	149,500	13,171	109,912	39,721	5,611	24,361	2,407	**26,768**
Ilkeston	Mar. 31, 1913	May, 1903	,,	3 60	64,214	47,000	17,214	47,883	12,769	42,500	13,660	Nil	6,006	58	**6,064**
Ipswich	*Mar. 31, 1914	Nov., 1903	,,	14 70	116,471	114,300	2,171	115,676	7,776	96,912	18,447	11,994	22,964	862	**23,826**
Keighley	Mar. 31, 1913	Oct., 1904	,,	6 9	50,934	47,328	3,606	47,328	7,745	32,468	16,961	942	8,845	313	**9,158**
Kilmarnock	May 15, 1913	Dec., 1904	,,	5 47	65,000	52,625	12,375	53,191	9,519	44,766	7,379	4,017	8,543	248	**8,791**
Kirkcaldy	*May 15, 1914	Feb., 1903	,,	8 65	213,000	96,749	116,251	96,749	10,979	77,868	18,881	4,687	17,506	443	**17,949**
Lancaster	*Mar. 31, 1914	Jan., 1903	,,	4 65	...	45,700	...	43,684	9,077	30,450	15,350	3,074	5,779	158	**5,937**
Leith	May 15, 1913	Aug., 1905	,,	17 73	275,000	237,300	37,700	236,155	14,572	186,500	50,800	514	34,664	1,030	**35,694**
Leyton	Mar. 31, 1913	Dec., 1906	,,	18 40	306,427	306,371	56	295,376	15,966	249,165	48,876	3,445	68,809	1,558	**70,367**
Lincoln	*Mar. 31, 1914	Nov., 1905	S.	2 77	98,519	44,947	53,572	44,987	15,185	41,579	11,176	(l) 1,100	6,971	130	**7,101**
Liverpool	Dec. 31, 1913	Nov., 1898	E.	119 0	...	...	...	2,024,706	17,014	1,177,384	1,091,771	428,318	677,881	13,018	**690,899**
Lowestoft	Sep. 30, 1913	July, 1903	,,	4 6	96,230	89,912	6,318	89,912	22,064	76,283	15,231	...	11,365	296	**11,661**
Maidstone	Mar. 31, 1913	July, 1904	,,	7 3	82,932	82,582	350	79,098	11,239	67,191	15,391	Nil.	9,761	535	**10,296**
Manchester	*Mar. 31, 1914	June, 1901	,,	202 48	2,358,606	2,117,411	141,195	2,130,904	10,518	1,616,131	491,410	478,381	911,223	14,087	**925,310**
Nelson	Mar. 31, 1913	Feb., 1903	,,	3 69	38,000	37,832	168	37,832	9,795	30,118	7,714	...	10,240	51	**10,291**
Newport (Mon.)	Mar. 31, 1913	April, 1903	,,	14 28	219,250	196,250	23,000	193,191	13,463	164,763	31,487	9,095	37,555	995	**38,550**
Nottingham	Mar. 31, 1913	Jan., 1901	,,	37 40	730,300	725,945	4,355	638,005	17,479	426,818	217,041	64,242	164,746	2,404	**167,160**
Oldham	*Mar. 25, 1914	May, 1902	,,	28 6 (b) 8 31	509,723	442,047	67,676	444,565	15,835	311,148	133,167	8,455	114,481	1,689	**116,170**
Perth	May 15, 1913	Nov., 1905	,,	6 60	90,000	78,350	11,650	78,629	11,649	63,340	15,489	1,673	8,761	509	**9,270**
Plymouth	Mar. 31, 1913	Sept., 1899	,,	15 0	...	189,512	...	219,417	14,628	90,925	37,826	17,550	37,925	1,123	**39,048**
Pontypridd	Mar. 31, 1913	Mar., 1905	,,	8 48	136,019	135,919	100	137,148	15,946	109,757	26,052	Nil	21,580	313	**21,893**
Rawtenstall	Mar. 31, 1913	May, 1909	,,	15 71	193,290	181,526	11,764	181,776	14,442	162,451	19,075	3,177	25,410	1,126	**26,536**
Rochdale	*Mar. 31, 1914	May, 1902	,,	(i)40 2	356,991	347,782	9,209	353,066	16,020	347,782	95,573	11,000	82,878	298	**83,176**
Rotherham	Mar. 31, 1913	Jan., 1903	,, R.T	12 2 ...	... ...	... ...	... ...	162,504 ...	13,542 ...	144,850 ...	27,250 ...	21,203 ...	40,232 2,457	26 Nil	**40,258 2,457**
Salford	*Mar. 31, 1914	Oct., 1901	E.	75 64	1,050,666	724,469	326,197	723,923	9,554	532,821	191,648	28,492	272,758	54	**272,812**
Southampton	*Mar. 31, 1914	Jan., 1900	,,	18 54	277,241	261,219	16,022	258,299	13,831	164,454	89,483	13,433	67,672	2,926	**70,598**
Southend-on-Sea	Mar. 31, 1913	July, 1901	,,	11 49	130,000	129,961	39	143,808	12,384	116,940	12,784	3,045	34,453	465	**34,918**
Southport	Mar. 31, 1913	July, 1900	,,	(d) 10 63	292,000	196,500	95,500	118,708	11,004	153,530	42,970	442	16,928	386	**17,314**
South Shields	*Mar. 31, 1914	Mar., 1906	,,	10 21	251,882	175,056	76,826	173,599	16,916	146,912	33,413	(l) 6,881	37,744	586	**38,330**
Staly'ge, H., M., D.	*Mar. 31, 1914	May, 1904	,,	27 57	325,270	274,990	44,280	279,778	10,096	217,173	63,817	811	40,333	292	**40,625**
Stockport	Mar. 31, 1913	Aug., 1901	,,	27 5	305,028	217,804	87,224	251,508	9,145	167,300	67,199	33,552	(n)62,979	1,198	**64,178**
Sunderland	*Mar. 31, 1914	Aug., 1900	,,	20 28	308,699	303,211	5,488	305,493	15,012	172,370	121,890	39,508	74,861	365	**75,226**
Wallasey	*Mar. 31, 1914	Mar., 1902	,,	19 77	198,867	195,290	3,577	216,498	10,848	161,934	64,221	9,520	63,151	562	**63,713**
Walsall	Dec. 31, 1913	Dec., 1902	,,	19 44	188,145	188,100	45	183,351	9,378	159,561	58,366	33,873	32,991	682	**33,673**
Walthamstow	Mar 31, 1913	June, 1905	,,	12 42	198,000	180,000	18,000	173,241	13,851	160,982	19,018	4,687	37,191	785	**37,976**
Warrington	*Mar. 31, 1914	April, 1902	,,	9 52	103,674	102,896	778	102,128	10,583	70,476	32,422	10,000	23,232	521	**23,753**
West Ham	*Mar. 31, 1914	Feb., 1904	,,	30 4	563,478	551,588	11,890	556,878	18,532	527,934	104,716	32,740	142,034	3,155	**145,189**
Wigan	Mar. 31, 1913	April, 1901	,,	(k) 34 42	...	...	...	...	...	...	...	...	71,268	1,515	**72,783**
Wolverhampton	*Mar. 31, 1914	April, 1902	S.	21 40	279,733	268,185	11,548	287,569	13,378	215,166	61,351	54,864	56,444	759	**57,203**
Yarmouth (Gt.)	*Mar. 31, 1914	June, 1902	E.	14 58	149,600	124,750	24,850	126,363	9,207	116,450	25,996	9,075	25,712	527	**26,239**
York	*Mar. 31, 1914	Jan , 1910	,,	12 20	157,150	157,150	340	156,810	12,853	152,470	6,323	5,092	26,133	642	**26,775**

TABLE II.—TOWNS WITH SEPARATE GENERATING STATIONS FOR TRACTION.

Belfast	*Mar. 31, 1914	Nov., 1905	E.	98 54	1,528,146	1,381,200	146,946	1,440,959	14,565	1,343,000	224,840	97,783	268,250	3,812	**272,062**
Bexley	Mar. 31, 1913	Oct., 1903	,,	6 42	99,942	97,387	2,555	96,927	14,912	76,492	20,895	959	13,654	(o)1,542	**15,196**
Birkenhead	*Mar. 31, 1914	Feb., 1901	,,	24 7	376,398	369,528	6,870	371,097	15,406	239,201	130,267	22,655	67,725	4,300	**72,025**
Bournemouth	Mar. 31, 1913	July, 1902	,,	(e) 29 62	449,027	...	...	435,788	19,500	221,797	134,815	13,733	95,695	317	**96,012**
Cardiff	*Mar. 31, 1914	May, 1902	,,	31 66	830,382	787,292	43,090	786,510	24,714	514,059	273,232	104,002	141,519	24,681	**166,200**
Coventry	*Mar. 31, 1914	Jan., 1912	,,	15 61	251,014	235,574	15,440	229,197	14,541	230,596	8,517	3,983	42,751	733	**43,484**
Glasgow	*May 31, 1914	Oct., 1898	,,	193 40 (b) 2 53	3,714,266	3,694,143	20,123	3,675,317	19,023	2,517,360	1,176,783	2,196,808	1,078,691	5,156	**1,083,847**
Huddersfield	*Mar. 31, 1914	Feb., 1901	,,	48 41	772,662	407,142	365,520	458,878	9,460	239,984	176,542	30,974	112,660	3,660	**116,320**
Hull	Mar. 31, 1913	July, 1899	,,	30 44	677,673	541,871	135,802	542,371	17,753	527,641	147,925	125,407	157,048	1,393	**158,441**
Leeds	*Mar. 31, 1914	Aug., 1897	,,	114 5	1,701,455	1,626,422	75,033	1,571,196	14,384	1,286,916	534,631	4,801	423,516	3,939	**427,455**
Leicester	Dec. 31, 1913	May, 1904	,,	37 0	929,120	727,405	201,715	739,982	19,999	602,478	129,807	100,000	147,458	17,059	**164,517**
London	Mar. 31, 1913	...	H.	15 70	...	...	...	...	...	...	...	...	37,544	879	**38,423**
		May. 1903	C.E	272 40	(c)	(c)	(c)	12,268,095	...	11,734,060	2,515,747	906,796	2,143,559	69,748	**2,213,307**
N'castle-on-Tyne	*Mar. 31, 1914	Dec , 1901	E.	62 72	1,522,010	1,277,747	244,263	1,284,380	20,428	929,766	428,119	94,337	251,024	10,177	**261,201**
Northampton	*Mar. 31, 1914	July, 1904	,,	9 16	239,800	127,255	112,545	126,431	13,742	87,022	40,501	11,834	28,527	812	**29,339**
Portsmouth	Mar. 31, 1913	Sep., 1901	,,	30 66	662,280	698,319	...	712,792	23,118	647,489	234,258	94,934	108,087	1,745	**109,832**
Preston	Mar. 31, 1913	June, 1904	,,	17 16	224,102	187,270	36,832	187,269	10,888	119,790	42,091	36,841	42,964	306	**43,270**
Reading	Mar. 31, 1913	July, 1903	,,	13 14	235,000	234,000	1,000	229,372	17,409	169,642	59,896	17,831	32,984	1,030	**34,014**
Sheffield	*Mar. 25, 1914	Sep., 1899	,,	79 3	1,640,371	1,426,217	214,154	1,521,439	19,250	1,073,612	463,575	30,378	386,114	3,562	**389,676**
Wellington, N.Z.	Mar. 31, 1913	...	,,	30 7	496,423	496,423	Nil	606,771	20,165	496,423	39,486	109,066	149,446	826	**150,272**

C—Electric conduit system. E—Electric trolley system. H—Horse lines RT—Railless trolley system. S—Surface contact system.
(b) Additional lines leased and worked. (c) Conferred by Annual Money Act, which limits amount for each financial year. Powers not exercised are lapsed.
(d) Not including 8 m. 78 ch. leased lines. (f) Unlimited. (h) Includes 1¼ miles railless trolley route. (i) 17 mi. 8 chn. single track leased.
(k) Not including 10 miles 3 chains single track lines leased. (l) Including Insurance. (n) Includes £114 trackless cars. (o) Includes £1,310 through-running contributions.
(p) Including leased lines. (q) Corporation working commenced June, 1906.

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

Specially Compiled for "The Tramway and Railway World."

TABLE I.—TOWNS WITH COMBINED GENERATING STATION FOR TRACTION AND LIGHTING PURPOSES.

Name.	Working Expenses.					Gross Profit on Working.	Additions to Gross Profit.	Deductions from Gross Profit.					Net Surplus + or Deficit −
	Traffic.	General.	Repairs & Maintenance.	Power.	Total.			Interest.	Sinking Fund.	Income Tax.	Depreciation & Renewal.	Sundries.	Total.	
Aberdeen	22,265	10,290	7,180	7,301	47,036	38,231	1,102	6,701	4,897	...	14,533	213	26,344	+ 12,989
Accrington	7,570	2,792	2,268	4,880	17,510	12,683	...	3,969	3,783	198	3,100	65	11,115	+ 1,568
Ashton-und r-Lyne	4,840	1,754	2,118	3,278	11,990	10,501	...	2,727	3,651	485	500	371	7,734	+ 2,767
Ayr	3,486	1,964	1,604	1,989	9,043	7,253	...	1,972	1,943	122	2,041	...	6,078	+ 1,175
Birmingham	183,119	59,947	88,698	113,743	445,507	189,964	8,487	68,478	53,804	...	...	197	122,479	+ 75,972
Blackburn	17,263	4,947	14,659	10,301	47,170	24,169	...	4,803	15,176	179	...	...	20,158	+ 4,011
Blackpool	16,643	6,851	9,719	10,273	43,486	41,311	...	(h)9,429	7,329	...	10,000	...	26,758	+ 14,553
Bolton	30,721	9,423	16,898	20,151	77,193	66,581	995	(h)11,250	17,387	1,239	18,357	1,446	49,659	+ 17,917
Bradford	92,305	29,243	58,991	50,611	231,150	85,983	3,877	20,443	31,822	3,888	11,454	5,053	72,660	+ 17,200
Brighton	14,691	4,716	14,420	8,613	42,440	14,398	122	7,895	5,783	...	...	...	13,678	+ 862
Burnley	23,284	7,571	11,998	20,096	62,949	25,367	...	6,939	7,728	1,072	...	(f)1,941	17,680	+ 7,687
Burton-on-Trent	5,442	1,502	2,562	3,154	12,660	3,847	(q)1,524	1,364	1,344	...	1,500	...	4,208	+ 1,163
Bury	15,735	5,416	7,011	7,684	35,846	34,234	151	7,904	4,895	462	3,124	(w)12,000	28,385	+ 6,000
Chester	3,349	1,574	878	2,203	8,004	4,726	93	(h)2,761	1,018	..	1,040	...	4,819	...
Chesterfield	2,739	1,230	1,912	2,110	7,991	4,703	253	2,287	1,849	...	...	...	4,136	+ 820
Colchester	2,783	1,286	2,177	2,566	8,812	2,087	67	2,081	2,406	...	...	...	4,487	− 2,333
Croydon	29,938	6,976	14,626	18,203	69,743	17,283	664	7,943	7,415	1,227	...	1,132	17,717	+ 230
Darlington	4,192	754	1,912	1,945	8,811	3,365	102	2,010	1,966	105	404	59	4,544	− 1,077
Darwen	3,594	831	3,096	2,395	9,916	5,504	141	2,298	2,191	...	1,050	...	5,539	+ 106
Derby	E 17,320 H 540	2,906 ...	5,499 81	8,610 ..	34,335 621	17,839 def. 173	239	6,236	3,464	...	5,536	(l) 185	15,421	+ 2,657
Doncaster	4,364	1,156	4,698	3,561	13,779	6,483	84	2,876	1,737	...	664	...	5,277	+ 1,290
Dundee	16,477	5,607	7,122	10,216	39,422	25,623	...	8,606	6,020	233	9,254	...	24,113	+ 1,510
East Ham	18,730	6,802	12,067	10,521	48,129	6,786	...	(h) 5,570	6,882	...	...	573	13,025	− 6,239
Exeter	4,511	1,175	1,311	3,499	10,496	6,252	...	(h) 2,347	1,814	48	...	...	4,209	+ 2,043
Gloucester	7,027	1,703	3,226	1,925	13,881	4,136	...	(h)5,325	1,980	95	250	...	7,650	− 3,514
Halifax	29,239	7,803	15,805	20,426	73,273	36,377	...	10,288	11,617	...	56	773	22,734	+ 13,643
Ilford	9,482	2,424	4,116	4,279	20,301	6,467	557	4,894	4,146	...	...	...	9,040	− 2,016
Ilkeston	2,057	614	2,497	1,308	6,476	def.412	524	1,748	1,694	..	...	(i) 412	3,854	− 3,330
Ipswich	8,538	2,250	5,578	3,522	19,888	3,938	...	(h) 3,624	2,142	...	...	...	5,766	− 1,828
Keighley	2,692	768	899	1,612	5,971	3,187	179	1,116	1,881	...	...	(m) 369	3,366	...
Kilmarnock	2,921	599	800	1,633	5,953	2,838	...	(h)1,623	1,233	3	1,160	28	4,047	− 1,209
Kirkcaldy	4,942	1,424	2,007	3,081	11,454	6,495	...	2,656	2,355	...	410	233	5,654	+ 841
Lancaster	2,290	522	841	1,594	5,247	690	52	1,158	1,511	...	...	...	2,669	− 1,927
Leith	9,204	2,631	4,213	3,468	19,516	16,178	272	(h)6,343	7,750	13	...	70	14,176	+ 2,274
Leyton	(p)21,929	6,544	11,592	12,875	52,940	17,427	133	10,048	8,064	...	...	228	18,340	− 780
Lincoln	1,473	644	973	960	4,050	3,051	402	1,529	1,071	...	...	...	2,600	+ 853
Liverpool	180,226	61,361	84,026	121,185	446,798	244,101	24,220	48,971	60,318	...	(d)54,163	(e) 4,869	168,321	+ 100,000
Lowestoft	3,320	743	1,579	2,685	8,327	3,334	..	(h) 2,499	2,031	...	...	...	4,530	− 1,196
Maidstone	2,405	1,018	1,469	1,903	6,795	3,501	58	2,687	2,243	...	...	32	4,962	− 1,465
Manchester	276,663	89,420	89,649	129,492	585,224	340,086	13,594	(h)55,729	54,599	9,418	97,219	33,625	250,590	+ 103,000
Nelson	2,425	677	1,320	2,006	6,428	3,863	...	1,008	966	...	...	...	1,974	+ 1,889
Newport (Mon.)	10,254	4,009	10,364	7,014	31,671	6,879	808	5,817	4,197	...	...	...	10,014	− 2,327
Nottingham	43,601	15,142	18,684	30,847	108,274	58,886	...	14,349	19,762	...	...	...	34,111	+ 24,775
Oldham	26,908	8,585	22,246	20,564	78,303	37,867	1,317	15,559	11,718	1,352	...	(g) 5,654	34,283	+ 4,901
Perth	3,182	698	418	1,252	5,550	3,720	50	1,523	1,632	3	612	...	3,770	...
Plymouth	8,031	4,161	4,322	7,905	24,419	14,629	1,257	4,793	3,932	...	4,465	...	13,130	+ 2,696
Pontypridd	5,017	1,395	5,476	3,196	15,084	6,809	1,754	(h)4,009	4,160	...	...	39	8,208	+ 355
Rawtenstall	5,415	2,133	3,445	4,113	15,106	11,430	(q) 1,612	5,947	6,113	...	...	...	12,060	+ 982
Rochdale	18,789	5,167	9,525	10,949	44,429	38,747	1,397	11,485	9,594	1,020	...	(x)9,555	31,654	+ 8,490
Rotherham	E 9,212 RT 557	2,778 273	5,711 633	8,591 369	26,292 1,832	13,966 625	...	4,918 73	3,261	...	5,037	...	13,216 73	+ 750 + 552
Salford	79,460	23,804	25,203	50,303	178,770	94,042	5,044	(h)17,392	22,470	2,760	5,674	(k)28,790	77,086	+ 22,000
Southampton	19,977	5,011	9,212	12,321	46,521	24,077	180	7,333	7,433	554	...	...	15,320	+ 8,937
Southend-on-Sea	8,046	2,260	3,534	6,187	20,027	14,891	4,228	(h) 3,834	1,753	...	4,017	...	9,605	+ 9,514
Southport	4,428	2,140	2,662	3,263	12,493	4,821	6,362	6,513	5,017	...	1,977	628	14,135	− 2,952
South Shields	8,838	3,715	3,633	6,399	23,585	15,745	265	(h) 5,333	3,570	...	...	...	8,903	+ 7,107
Staly'dge,H.,M.,D.	13,073	4,883	6,163	6,724	30,843	9,782	...	(h) 7,093	7,527	...	311	721	15,652	− 5,870
Stockport	13,876	3,520	6,852	5,929	30,179	33,998	1,197	5,639	8,701	1,053	2,698	5,602	23,696	+ 11,500
Sunderland	19,609	5,294	6,482	11,276	42,661	32,565	259	(h) 6,837	9,948	637	10,002	400	27,824	+ 5,000
Wallasey	17,686	4,792	6,512	11,500	40,490	23,223	92	5,603	4,885	...	...	634	11,122	+ 12,193
Walsall	8,019	3,201	4,678	5,710	21,608	12,065	1,371	5,191	3,439	458	1,868	...	10,956	+ 2,480
Walthamstow	14,731	2 646	6,717	8,175	32,269	5,707	210	(h) 6,085	2,698	...	...	...	8,783	− 2,866
Warrington	5,999	1,834	3,973	3,411	15,217	8,536	537	2,481	3,353	...	...	...	5,834	+ 3,239
West Ham	53,477	18,084	33,440	21,174	126,175	19,014	...	20,056	12,398	692	...	290	33,436	− 14,422
Wigan	...	...	...	...	41,318	31,465	...	13,859	12,391	...	...	3,781	...	...
Wolverhampton	12,793	5,177	7,620	7,536	33,126	24,077	(x) 1,305	7,793	5,285	187	6,564	...	19,829	+ 5,553
Yarmouth (Gt.)	7,756	1,849	3,052	4,951	17,608	8,631	75	(h) 4,065	2,826	...	1,815	...	8,706	...
York	8,713	2,028	1,936	5,259	17,936	8,839	...	(h) 4,609	1,706	...	...	...	6,315	+ 2,524

TABLE II.—TOWNS WITH SEPARATE GENERATING STATIONS FOR TRACTION.

Belfast	77,949	12,593	41,455	28,281	160,278	111,784	931	48,342	31,353	1,072	17,000	3,082	100,849	+ 11,866
Bexley	3,455	1,011	2,332	1,167	(s) 10,118	5,078	40	2,850	2,410	...	242	...	5,502	− 384
Birkenhead	17,015	5,374	11,759	10,744	44,892	27,133	83	(h)11,577	9,499	373	5,712	55	27,216	...
Bournemouth	22,307	6,912	9,107	13,967	52,293	43,719	723	10,733	15,371	...	...	(e) 8,017	34,121	+ 10,321
Cardiff	44,037	11,121	18,146	26,260	99,564	66,636	2,592	23,941	23,014	2,835	6,946	...	56,736	+ 12,492
Coventry	12,861	4,471	7,945	3,839	29,116	14,368	478	8,506	5,230	...	277	414	14,427	+ 419
Glasgow	332,546	134,034	156,214	53,483	676,277	407,570	64,989	82,921	102,607	14,057	212,642	6,440	418,667	+ 53,892
Huddersfield	28,548	6,253	27,821	8,349	70,971	45,349	519	(h)11,617	11,004	1,545	...	406	24,572	+ 21,296
Hull	47,495	12,212	42,005	11,245	112,957	45,484	1,500	16,730	12,201	1,500	(u)3,118	...	33,549	+ 13,435
Leeds	113,819	41,144	41,020	30,399	226,382	201,073	8,354	44,961	53,914	5,344	31,576	3,627	139,422	+ 70,005
Leicester	51,257	10,405	21,566	23,887	110,115	54,402	3,763	23,541	12,453	2,122	7,636	2,413	48,165	+ 10,000
London	H 19,064 E 742,157	4,670 (r) 185,634	6,592 312,395	(m)22,122 220,042	52,448 1,460,228	def.14,025 753,079	... 33,397	342,645	388,042	28,188	497	(t)27,104	786,476	...
N'castle on-Tyne	71,892	25,519	27,150	22,991	147,552	113,649	4,086	(h)31,257	41,450	3,618	...	2,805	79,130	+ 38,605
Northampton	7,881	3,169	2,806	4,958	18,814	10,525	506	(h) 3,322	4,422	309	195	(b)1,083	9,331	+ 1,700
Portsmouth	28,918	10,200	7,877	5,231	52,226	57,606	8,831	20,875	17,462	964	8,412	350	48,063	+ 18,374
Preston	10,781	4,592	6,263	2,429	24,065	19,205	...	3,933	4,891	..	3,649	1,358	13,831	+ 5,374
Reading	8,837	3,702	3,648	3,358	19,545	14,469	...	6,714	4,662	291	...	...	11,667	+ 2,802
Sheffield	121,630	27,956	48,047	35,128	232,761	156,915	2,821	35,305	43,518	3,306	30,123	7,871	120,123	+ 39,613
Wellington, N.Z.	56,296	7,242	21,330	16,260	101,128	49,144	2,664	19,961	4,778	...	14,068	4,702	43,509	+ 8,299

(b) Includes £311 loss on omnibus account. (c) Includes £1,611 insurance fund. (d) Includes reserve. (e) Includes rents for leased lines.
(f) Rent of leased lines. (g) Rent of lines and deficit on motor omnibus account. (h) Including income tax. (i) Loss on working. (k) Includes rents of lines.
(l) Including loss on horse traction. (m) Horsing expenses. (n) Transferred to motor omnibus capital account. (p) Includes £396 horse account.
(q) Aid from rates £1,500. (r) Including special charges, £5,911. (s) Includes £2,153 through-running contributions to L.C.C.
(t) District fund widening streets. (w) Amount apportioned to leased lines. (x) Includes £365 profit on motor char-a-banc.
(x) Includes £6,519 rent of leased lines. ; £2,950 profit from 3 months' working.

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

Specially Compiled for "The Tramway and Railway World."

TABLE I.—TOWNS WITH COMBINED GENERATING STATION FOR TRACTION AND LIGHTING PURPOSES.

Name.	Appropriation of Net Surplus.			Receipts per Car Mile.		Operating Expenses per Car Mile.					Percentage of Operating Expenses to Total Revenue.	Average Operating Expenses per Car Mile (excluding Power Costs).	Board of Trade Units.		
	Carried Forward.	Reserve.	Contribution to Rates or Municip'l Funds.	Average Total per Car Mile. d.	Average Traffic per Car Mile. d.	Traffic. d.	General. d.	Repairs and Maintenance. d.	Power. (Price paid) d.	Total. d.	%	d.	Units.	Cost per Unit. d.	Units used per car mile.
Aberdeen ...	...	12,989	...	11·17	11·04	2·916	1·348	·940	·956	6·16	55·16	5·415	2,170,033	·80	1·184
Accrington ...	...	...	1,568	12·64	12·49	3·17	1·18	·94	2·04	7·33	57·99	5·29	949,054	1·23	1·65
Ashton-u-Lyne	...	...	1,000	11·682	11·534	2·514	·911	1·100	1·703	6·228	53·31	4·525	622,183	1·25	1·346
Ayr...	..	1,175	...	10·13	9·713	2·16	1·23	·99	1·24	5·62	55	4·35	378,570	1·26	·98
Birmingham ...	...	31,000	44,972	10·689	10·564	3·080	1·009	1·492	1·913	7·494	70	5·581	24,257,823	1·125	1·70
Blackburn ...	4,011	...	...	14·08	13·46	3·41	·97	2·93	2·06	9·37	66·10	7·37	1,901,668	1·3	1·64
Blackpool ...	...	2,553	12,000	18·91	18·74	3·71	1·52	2·17	2·29	9·69	51·28	7·40	1,506,323	1·63	1·40
Bolton	417	...	17,500	11·944	11·838	2·552	·782	1·404	1·674	6·412	53·064	4·664	4,396,543	1·1	1·52
Bradford	...	...	17.200	12·166	11·486	3·204	1·051	2·173	1·948	8·376	73·138	6·428	12,041,279	1	1·924
Brighton ...	842	...	...	11·794	11·33	3·049	·978	2·992	1·787	8·806	74·66	7·02	1,722,548	1·2	1·49
Burnley	...	...	7.687	12·079	12·043	3·185	1·035	1·640	2·749	8·609	71·37	5·86	3.894,011	1·24	2·22
Burton-on-Trent	1,163	...	...	9·02	8·28	2·97	·82	1·40	1·72	6·91	76·7	5·08	545.672	1·39	1·08
Bury	...	(k)1,000	5,000	10·38	10·26	2·315	·769	1·213	1·252	5·549	50·44	4·297	2,037,620	1	1·252
Chester	...	...	...	8·81	8·50	2·32	1·09	·61	1·52	5·54	63	4·02	385,132	1·33	1·11
Chesterfield ...	..	820	...	10·51	10·12	2·27	1·02	1·58	1·75	6·62	62·9	4·87	405,096	1·25	1·39
Colchester ...	...	...	...	8·058	7·682	2·058	·95	1·61	1·897	6·515	80·36	4·618	410,555	1·5	1·26
Croydon	...	230	...	7·464	7·284	2·568	·599	1·254	1·561	5·982	79·53	4·42	2,874,462	1·522	1·027
Darlington ...	...	...	...	7·651	7·441	2·633	·480	1·202	1·222	5·537	72·36	4·315	466,784	1	1·222
Darwen	106	...	...	14·218	14·204	3·771	·783	2·833	2·396	9·783	64·30	7·387	...	...	...
Derby	(n) 75	...	...	E. 10·358	10·150	3·438	·577	1·092	1·709	6·816	65·8	5·107	1,425,112	1·45	1·179
				H. 6·077	5·821	7·325	...	1·099	...	8·424	138·6	...	...	...	...
Doncaster ...	...	1,290	...	9·41	9·25	2·03	·54	2·18	1·65	6·40	69·1	4·75	683,651	1·25	1·32
Dundee	...	10	1,500	11·480	11·189	2·908	·989	1·257	1·803	6·957	60·6	5·154	2,451,897	1	1·803
East Ham ...	.	..	...	8·73	8·59	2·98	1·08	1·92	1·67	7·65	87·60	5·98	2,385,535	1·062	1·58
Exeter	...	2,043	...	9·272	9·272	2·498	·650	·726	1·937	5·811	62·67	3·874	516,793	1·625	1·192
Gloucester ...	...	...	...	6·77	6·32	2·64	·64	1·21	·72	5·21	77	4·49	481,967	1	·72
Halifax	1,818	5,792	6,033	11·738	11·627	3·130	·836	1·692	2·186	7·844	67	5·66	4,357,466	1·125	1·94
Ilford	...	...	...	7·616	7·464	2·698	·689	1·171	1·218	5·776	76·4	4·558	960,866	1·07	1·098
Ilkeston	...	...	...	6·727	6·661	2·281	·681	2·77	1·451	7·183	106·79	5·732	326,198	1	1·50
Ipswich	...	...	...	8·552	8·242	3·065	·807	2·002	1·265	7·139	83·47	5·874	676,189	1·25	1·011
Keighley	...	...	...	9·064	8·754	2·664	·761	·890	1·595	5·910	65	4·315	254,636	1·5	1·05
Kilmarnock ...	...	...		7·09	6·89	2·357	·482	·646	1·317	4·802	66·3	3·487	313,550	1·25	1·06
Kirkcaldy ...	341	...	5.0	9·162	8·936	2·522	·727	1·024	1·573	5·846	65·43	4·273	739,564	1	1·573
Lancaster ...	...	...	...	8·23	7·94	3·14	·71	1·16	2·19	7·20	88	5·02	225,094	1·7	1·29
Leith	2,274	...	...	9·07	8·81	2·34	·67	1·07	·88	4·96	54·67	4·08	899,191	·92	·95
Leyton	...	...	...	9·368	9·161	(c) 2·920	·871	1·543	1·714	7·048	75·092	5·374	2,911,345	1·037	1·615
Lincoln	853	...	...	10·36	10·17	2·15	·94	1·42	1·40	5·91	57	4·51	190,838	1·25	1·12
Liverpool ...	...	...	100,000	12·34	12·10	3·217	1·096	1·500	2·164	7·977	63·2	5·813	23,928,396	1·138	1·78
Lowestoft ...	...	...	...	8·5	8·3	2·50	·56	1·2	2·0	6·26	71·58	4·26	368,242	1·75	1·1
Maidstone ...	...	...	...	8·36	7·93	1·96	·82	1·19	1·55	5·52	69·58	3·97	365,309	1·25	1·236
Manchester ...	...	...	103.090	11·410	11·236	3·411	1·103	1·105	1·597	7·216	63·25	5·619	30,035,057	1·034	1·543
Nelson	1,889	...	...	12·29	12·23	2·89	·81	1·58	2·39	7·67	62	5·28	240,804	2	1·2
Newport (Mon.)	...	...	...	9·557	9·310	2·542	·994	1·570	1·746	7·852	82·26	6·106	1,239,245	1·28	1·28
Nottingham ...	...	5,775	19,000	11·50	11·34	3·00	1·05	1·29	2·11	7·45	64·19	5·39	5,761,096	1·25	1·65
Oldham	...	4,901	...	13·422	13·228	3·109	·992	2·570	2·376	9·047	67·40	6·671	3,291,607	1·5	1·585
Perth	...	...	...	8·79	8·31	3·02	·66	·39	1·19	5·26	59	4·07	277,474	1·08	1·09
Plymouth ...	...	...	2,696	11·790	11·094	2·349	1·217	1·264	2·312	7·142	62·53	4·830	1,139,761	1·667	1·38
Pontypridd ...	355	...	...	12·16	11·99	2·78	·78	3·04	1·78	8·38	68·89	6·6	613,719	1·25	1·42
Rawtenstall ...	...	982	...	11·49	11·01	2·35	·92	1·49	1·78	6·54	56·69	4·76	734,781	1·38	1·33
Rochdale	8,490	...	...	11·163	11·123	2·520	·692	1·307	1·556	6·075	53·4	4·519	2,610,994	1·006	1·546
Rotherham ...	E. ...	...	750	12·50	12·50	2·86	·86	1·77	2·67	8·16	65·31	5·49	1,499,517	1·375	1·94
	R.T 552	...	...	10·36	10·36	2·35	1·15	2·66	1·56	7·72	74·56	6·16	64,520	1·375	1·13
Salford	...	...	22,000	10·501	10·499	3·059	·916	·970	1·936	6·881	65	4·945	9,812,392	1·23	1·606
Southampton ...	6,577	...	2,360	10·974	10·520	3·105	·779	1·432	1·915	7·231	66	5·316	2,004,408	1·5	1·29
Southend-on-Sea	2,514	1,000	6,000	13·14	12·97	3·03	·85	1·33	2·33	7·54	57·35	5·21	848,538	1·75	1·33
Southport ...	...	...	...	9·595	9·381	2·454	1·186	1·475	1·808	6·923	72·1	5·101	513,285	1·5	1·185
South Shields ...	(d) 500	4,907	1,700	10·244	10·087	2·362	·993	·971	1·710	6·036	58·92	4·326	1,105,203	1·388	1·231
Stalybridge, &c.	...	...	...	8·426	8·365	2·711	1·013	1·278	1·394	6·396	75·92	5·002	1,793,157	·9	1·549
Stockport ...		250	11,250	10·77	10·57	2·323	·592	1·152	·996	5·063	47·02	4·067	1,897,114	1·069	1·327
Sunderland ...	...	...	5,000	12·00	11·943	3·128	·844	1·034	1·799	6·805	56·97	5·0	1,804,219	1·5	1·19
Wallasey ...	1,443	3,000	7,750	11·844	11·739	3·287	·891	1·211	2·138	7·527	63·5	5·38	1,971,378	1·4	1·52
Walsall	1,480	...	1,000	11·234	11·007	2·675	1·068	1·561	1·905	7·209	64	5·304	845,654	1·68	1·176
Walthamstow ...	...	...	...	7·92	7·76	3·07	·55	1·40	1·71	6·73	84·97	5·02	1,426,964	1·375	1·24
Warrington ...	739	...	2,500	12·521	12·246	3·161	·966	2·096	1·798	8·021	68·273	6·223	545,817	1·5	1·199
West Ham ...	...	...	...	9·27	9·075	3·417	1·154	2·137	1·353	8·061	88	6·708	6,974,894	·75	1·85
Wigan	...	...	...	12·05	11·80	...	...	...	...	6·84	56·77	5·09	2,132,384	...	1·471
Wolverhampton	...	...	5,553	11·485	11·333	2·569	1·039	1·530	1·513	6·651	57·9	5·138	1,845,821	1	1·542
Yarmouth (Gt.)	...	...	...	8·738	8·563	2·583	·616	1·016	1·649	5·864	68·48	4·215	758,296	1·56	1·052
York	...	2,524	...	9·08	8·86	2·95	·69	·66	1·78	6·08	67	4·30	1,009,827	1·25	1·43

TABLE II.—TOWNS WITH SEPARATE GENERATING STATIONS FOR TRACTION.

									*					Works Cost.	
Belfast	...	...	11,866	9·51	9·38	2·72	·44	1·46	·99	5·61	58·91	4·62	11,000,708	·617	1·37
Bexley	..	..	...	13·77	12·37	3·19	·73	2·20	1·1	7·22	66·6	6·12	405,140	1·1	1·52
Birkenhead ...	...	...	...	12·643	12·496	3·140	·991	2·170	1·336	7·637	60·33	6·30	2,672,599	·65	2·054
Bournemouth ..	...	10,321	...	12·24	12·20	2·85	·88	1·16	(b) 1·78	6·67	54·46	4·89	2,917,309	·583	1·55
Cardiff	845	2,047	9,600	11·65	11·45	3·563	·900	1·468	·850	6·781	60	5·931	5,073,942	·488	1·71
Coventry ...	419	...	...	9·271	9·115	2·742	·953	1·694	·819	6·208	66·9	5·389	1,652,029	·544	1·47
Glasgow	...	...	53,892	10·659	10·609	3·271	1·318	1·536	·526	6·651	62·69	6·125	33,685,570	·378	1·38
Huddersfield ...	6,662	14,634	...	11·34	10·98	2·78	·61	2 72	·81	6·92	61·01	6·00	4,881,338	·42	1·94
Hull	..	1,435	12,000	9·42	9·33	2·82	·68	2·46	·67	6·63	71·04	5·96	4,855,082	·67	1·31
Leeds	...	...	70,005	11·145	11·042	2·967	1·073	1·070	·792	5·902	52·96	5·110	17,175,710	·493	1·801
Leicester	...	...	10,000	9·801	8·785	3·232	·620	1·285	1·423	6·560	66	5·137	7,141,333	·411	1·77
London	...	...	...	H. 8·73	8·53	4·32	1·07	1·50	5·02	11·91	136·50	11·91	...	...	...
				E. 10·04	9·73	3·36	·84	1·42	1·00	6·62	65·97	5·62	138,714,732	·619	2·62
N'castle-on-Tyne	...	25,135	13,470	11·709	11·253	3·222	1·144	1·217	1·031	6·614	54·96	5·583	10,231,454	·421	1·922
Northampton ...	...	1,200	500	10·69	10·39	2·87	1·15	1·03	1·80	6·85	64	5·05	966,282	1·23	1·47
Portsmouth ...	11,374	(f) 5.000	4,000	12·229	12·035	3·220	1·136	·877	·582	5·815	47·55	5·233	2,599,210	·543	1·206
Preston	...	5.374	...	10·698	10·50	2·665	1·135	1·550	·600	5·95	55·63	5·35	1,516,545	·384	1·309
Reading	...	2,802	...	8·920	8·650	2·319	·970	·957	·880	5·126	57	4·246	1,033,313	·78	·99
Sheffield	7,032	2,000	30,581	10·527	10·431	3·286	·755	1·298	·949	6·288	59·732	5·339	18,601,705	446	1·933
Wellington, N.Z.	8,299	...	...	15·654	15·568	5·864	·755	2·222	1·694	10·535	67·3	8·841	4,921,406	·80	2·13

* The figures given under "Power" in Table II. include actual works costs only. H—Horse lines. E—Electric trolley system. (b) Including ·88d. per car mile current supplied by Bournemouth and Poole Supply Company. (c) Horse account ·053d. (d) Accident, insurance, and compensation fund. (f) Insurance fund. (i) Including Insurance. (k) Insurance. (n) Remainder expended in paying capital expenditure not borrowed. (t) Amounts for 15 months.

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

Specially Compiled for "The Tramway and Railway World."

TABLE I.—TOWNS WITH COMBINED GENERATING STATION FOR TRACTION AND LIGHTING PURPOSES.

Name.	Population Served.	Traffic Records. Car Mileage.	Passengers Carried.	Passengers Carried per Car Mile.	Average Fare per Passenger. d.	Average Journeys per Head of Populat'n per Annum.	Average Car Miles per Day per Car.	Traffic Revenue per Mile of Single Track. £	Average Traffic Revenue per Annum per Head of Populat'n Served.	Operating Expenses per Passenger. d.	Average Distance of 1d. Fare. Miles.	Average Fare Charged per Mile. d.	Average Speed per Hour. Miles.	Average Total Car Hours per Day.	Average Number of Cars in Use Daily.	Number of Cars in Stock.
Aberdeen ...	165,000	1,832,587	22,218,142	12·11	·91	134·6	93	3,064	10/3	·508	1·80	·58	7·5	703	54	77
Accrington ...	45,525	573,536	4,998,979	8·72	1·377	109·8	105	3,033	13/1	·84	1·07	·929	7·5	250	18	27
Ashton-u-L.	50,000	462,060	4,928,282	10·666	1·081	98·565	105	2,712	8/10	·584	1·223	·81	8	190	12	23
Ayr ...	33,000	385,986	3,880,850	10·05	·96	117	106	2,079	9 6	·558	1·25	·75	8	140	10	20
Birmingham	868,430	14,268,244	146,930,986	10·29	1·03	169	79·77	5,482	14 5	·904	2·	·427	7·87	10·16	500	550
Blackburn ...	200,000	1,149,462	12,731,532	11·07	1·28	63·15	105	2,751	6·10	·88	1·25	·76	7·5	448	32	61
Blackpool ...	67,500	1,075,943	14,289,802	13	1·41	211·7	86·7	4,524	24/9	·73	...	...	8	...	34	78
Bolton ...	221,000	2,888,930	32,019,574	11·08	1·062	144·8	122·85	3,032	13/-	·578	1·553	·633	7·25	1,030	73	112
Bradford ...	370,000	6,255,878	67,675,166	10·816	1·058	182	113	2,792	16/2	·819	1·67	·531	7·3	2,340·5	151	248
Brighton ...	133,096	1,156,584	11,839,515	10	1·11	88·95	83·36	3,176	8/2	·86	1·27	·788	6·41	544	34	50
Burnley ...	175,000	1,754,811	17,668,834	10·07	1·18	101	120	3,971	10/1	·85	1·25	·83	7	874	46	67
Burton ...	48,000	439,248	3,339,184	7·60	1·058	70	...	1,782	6/3	·91	1·505	·58	7·5	...	...	20
Bury	128,202	1,631,126	15,831,487	10	1·06	123·5	98·80	2,028	10/10	·543	1·24	·85	8·51	483·83	45·26	54
Chester	39 028	346,645	3,067.815	8·85	·96	78·6	95	1,906	6/4	·626	1·27	·8	7	150·60	10·04	18
Chesterfield	38,000	289,745	2,631,398	9·08	1·1	69	122	2,407	6·8	·728	1·38	·75	7·33	126	7	14
Colchester ...	44.700	324,622	1,757,794	6·58	1·42	47·84	89·6	1.309	4/8	1·20	·85	·96	6·78	142·27	9·88	18
Croydon ...	178,094	2,801,302	19 227,878	6·87	1·06	107·96	129	4,818	9/10	·871	2·05	·50	8·14	942·23	59	75
Darlington ...	58.000	381,920	3,791,835	9·9	·75	65·38	95·1	1,345	4/1	·557	1·219	·45	6·66	151·25	11	16
Darwen ...	40,611	252,710	2,755.011	10·91	1·24	67·83	...	1,989	7/-	·864	...	...	...	...	...	...
Derby ...	124,000	E 1,208,880 H. 17,710	12,136,148 110,231	10·039 6·224	1·011 ·935	97·88	...	2,398 ...	8/3 ...	·67 1·35	1·44 1	·75 1	6·375 ...	... ...	... ...	50 3
Doncaster ...	52,000	516,540	5,072,172	9·81	·952	97·54	103	1,591	7/8	·652	1·25	·76	7·5	218	16	25
Dundee ...	165,000	1,359,821	17,734,162	13·04	·857	107	...	2,305	7/8	·533	2	·50	7·3	...	...	68
East Ham ...	145,000	1,810,251	16,671,505	11·04	·78	115	150	3,704	7/1	·69	1·635	·634	7	216	32	45
Exeter ...	48,660	433,807	4,110.513	9·48	·98	84·48	...	2,392	6/11	·612	1	1	6	...	16	20
Gloucester ...	53.972	638,646	4,415,555	6·9	·91	82	92·05	1,122	6/3	·75	1·5	·66	7·08	264·1	19	30
Halifax ...	176,000	2,242,086	20,276,077	9·04	1·26	115	80·21	1,958	12/4	·867	1·30	·87	7·23	853·93	77	101
Ilford ...	82,000	843,517	7,578,813	8·79	·831	92·42	...	2,312	5/1	·64	1·543	·69	8	...	...	26
Ilkeston ...	32,000	216,348	1,404,447	6·49	1·26	43·9	95	1,604	3/9	1·106	1·50	·633	7	93	7	13
Ipswich ...	75,681	668,650	5.715,035	8·54	·975	75·51	65·5	1,559	6/1	·84	1·53	·693	5·51	332·80	20·80	36
Keighley ...	43,000	242,800	3,099,272	12·8	·68	72·06	55·35	1,447	4/1	·462	2·22	·45	6·87	126	7	12
Kilmarnock	36.000	297,557	2,317,709	7·78	·879	64·38	90·05	1,537	4/8	·616	1·13	·86	7·22	112·58	9·05	14
Kirkcaldy ...	39,600	470,162	5,781,895	12·3	·726	146	52	1,989	8/10	·475	1·522	·64	7	183	17	22
Lancaster ...	41,786	174,752	1,603.321	9·17	·865	38·37	76	1,204	2/9	·785	1·71	·5	8	87·22	6·23	12
Leith ...	110,400	944,329	9,706,611	10·28	·87	87·92	125	1,926	6/3	·482	1·32	·72	8·3	311	20·66	37
Leyton ...	124,735	1,802,647	17,476,453	9·69	·945	140	112	3,719	11/-	·727	...	...	8	...	...	60
Lincoln ...	20,000	164,499	1.826,885	11·11	·907	91·34	65·7	2,350	6·11	·532	1·75	·428	7	90	5	8
Liverpool ...	839,000	13,462,605	144,085,927	10·72	1·129	172	77	5,695	16/2	·744	2·514	·39	7·5	4,920	480	595
Lowestoft ...	35,000	315,341	2,613,797	8	1·04	70	72	2,788	6/6	·764	1·5	·7	5·75	192	12	19
Maidstone ...	25,000	295,438	2,224,200	7·528	1·053	88·968	81	1,387	7/1	·73	1	1	6·7	128	12	19
Manchester	945,280	19,463,646	205,608,741	11	1·06	218	94·7	5,054	19/3	·683	...	...	...	...	...	662
Nelson ...	45,000	200,996	2,776,785	13·82	·88	61·71	94·09	2,650	4/4	·555	1	1	5·50	108	6	11
Newport ...	87,626	968,067	9,251,181	9·56	·973	105·6	...	2,617	8/7	·821	1·75	...	...	...	37	44
Nottingham	260,000	3,485,789	38,484,032	11·04	1·02	148	92·08	4,514	12/8	·67	1·68	·65	6·86	...	104	135
Oldham ...	180,000	2,077,104	22,773,108	10·963	1·19	126·52	121	3,136	12/8	·825	1·11	·884	7	846	47	92
Perth ...	35,900	252,940	1,813,228	7·16	1·15	50·5	96·25	1,298	4/7	·73	...	...	6·25	120	8	12
Plymouth ...	112,000	820,406	8,839,974	10·77	1·029	78·92	...	2,528	6/9	·663	...	...	...	...	...	42
Pontypridd ...	40,000	432,006	5,047,168	11·68	1·02	126	81·2	2,509	10/9	·71	1·25	·51	6·5	221	17	26
Rawtenstall	50,000	553,813	4,949,775	8·93	1·23	98·72	126	1,600	10/2	·73	1·12	·88	9	198	12	24
Rochdale ...	130,000	1,778,030	14,584,777	8·16	1·36	112·2	114·90	2,079	12/9	·731	1·07	·90	7·66	660	44	69
Rotherham ...	64,000	E 772,610 H 56,887	8,774,539 191,088	11·35 3·36	1·104 3·08	137·12	...	3,352	12/7 2·3	·719	...	...	...	...	...	...
Salford ...	350.000	6,235,278	53,124,546	8·52	1·227	151	108	3,646	15 7	·88	2·20	·46	7·916	2,054	158	200
Southampt'n	122,200	1,543,941	13,162,224	8·52	1·23	108	77·38	3,624	11/1	·82	1·25	·55	...	...	...	70
Southend ...	78,000	637,366	7,581,104	11·89	1·09	97·2	87	4,708	8/10	·634	1·41	·76	6·5	357	21	31
Southport ...	31,312	433,068	4,401,336	10·63	·923	140·5	103	1,574	10/10	·68	1·6	·62	6·65	217·5	13·5	26
So'th Shields	111,357	898,015	10,005,164	11·414	·905	90	110	3,677	6 9	·54	3·1	·38	8·06	338	20	35
Stalybridge	94,063	1,157,163	9,900,591	8·556	·977	105·3	79	1,698	8/7	·748	1·22	·72	6·8	466	40	59
Stockport	120,000	1,429,396	11,544,225	8·0	1·39	96·20	78·32	2,290	10 5·9	·627	1·3	·7	7·5	471	29	53
Sunderland	170,000	1,504,356	18,475,671	12·2	·972	108·6	78·4	3,679	8/9	·554	1·34	·68	7	688	43	70
Wallasey ...	84,500	1,291,046	13,105,204	10·15	1·15	155	99·6	3,163	14/11	1	1·89	·54	7	525	48	61
Walsall ...	100,000	719,372	6,121,381	8·509	1·293	61	86	1,885	6/7	·847	1·24	·79	7	345	23	39
Walth'mst'w	128,000	1,151,029	11,807,549	10·258	·756	91·89	93	2,968	5/11	·655	1·15	·89	7·2	408	36	38
Warrington	86,000	455,304	6,134,545	13·473	·909	71·332	102·423	2,406	5/5	·59	1·246	·903	6·401	194·86	12·179	21
West Ham ...	296,600	3,756,384	41,152,502	10·95	·828	138	92	4,726	9/7	·73	1·80	·51	7·75	1,235	95	118
Wigan ...	200,000	1,449,188	13,018,833	8·98	1·314	65·1	105·5	2,309	7/2	·761	1·15	...	7·4	...	42	67
Wolverh'ton	135.000	1,195,326	12,616,881	10·555	1·07	93·44	89	2,625	8/4	·631	1·25	·879	6·85	660·6	36·7	52
Yarmouth ...	56,000	720,702	4,930,728	6·84	1·231	88·05	79	1,746	9/2	·857	1·25	·76	7	375	25	35
York	82,600	707,370	5,946,843	8·41	1·05	72	108	2,193	6/2	·73	1·33	·789	8	270	18	31

TABLE II.—TOWNS WITH SEPARATE GENERATING STATIONS FOR TRACTION.

Belfast ...	390,000	6,865,591	63,131,820	9·19	1·02	162	128	2,709	13/9	·61	1·96	·43	8·75	2,350	257	289
Bexley ...	16,500	264,864	2,090,533	7·89	1·57	127	130	2,100	16/6½	1·16	1·59	·63	10	136	8	16
Birkenhead	135,740	1,300,717	15,167,958	11·66	1·071	111·74	69·98	2,811	9/11	·71	1·39	·66	6·84	520·61	50·94	65
Bournem'uth	120,000	1,882,084	15,750,576	8·36	1·45	131	95	3,214	16/-	·796	1·19	·87	6·80	1,140	60	81
Cardiff ...	182,729	2,966,230	31,122,962	10·49	1·09	170	98·5	4,447	15 6	·65	1·44	·736	7·5	1,264	79	130
Coventry ...	135,000	1,125,705	8,407,719	7·5	1·22	62	66	2,714	6 4	·831	1·18	·866	6·4	476	40	46
Glasgow ...	1,150,000	24,403,482	336,654,624	13·795	·769	292·74	106·18	5,499	18/9	·482	2·31	·44	8·13	8,815·65	629·69	851
Huddersfield	160,000	(a) 2,461,107	22.616.710	9·21	1·19	174	82	3,634	14/1	·766	1·35	·71	7·62	885·28	55·33	96
Hull ...	287.032	4,040,739	42,997,226	10·64	·877	149·80	127·10	5,141	10/7	·631	2·75	...	9	1,393·6	87·10	160
Leeds ...	525.000	9,204,331	93,673,774	10·17	1·081	178	115·41	3,694	16/2	(b) ·916	1·93	·539	7·56	3.339	222	318
Leicester ...	230.970	4,028,542	37,073,717	9·202	·954	161	...	3,985	12·9	·712	2·18	·984	8	...	...	130
London ...	...	H 1,056,481	11,550,504	10·93	·78	...	77·12	2,365	...	1·09	...	...	5·85	500·84	38	74
		E52,886,623	501,102,149	9·48	1·03	...	117·15	7,867	...	·69	...	...	8·82	16,427·36	1,237	1,661
Newcastle ...	300.000	5,353,875	57,840,666	10·81	1·071	193	100	3,992	16/9	·612	1·58	·633	7·5	14·40	133	200
Northampt'n	91,500	658,809	7,309,863	11·09	·94	82·73	...	3,102	6 4	·617	1·34	·7	...	...	...	26
Portsmouth	241.256	2,155,508	24,520,647	11·37	1·052	101·63	84	3,505	9/-	·511	1·66	·62	7	1,072	72	100
Preston ...	120,000	970,719	9,567,366	9·85	1·06	79·73	132	2,498	7/2	·603	1·01	·95	7·36	...	...	33
Reading ...	76.000	915,180	8,251,274	9·01	·97	108	97	2,505	8 8	·57	1·59	·68	7	352	26	36
Sheffield ...	479,622	8,883,576	104,851,403	11·803	·884	218·594	104·644	4,885	16/1	·533	2·789	·379	...	3,372·5	232·587	335
Wellington ...	68.000	2,303,913	25.858.412	11·08	1·40	350	90	4,706	43/11	·94	1·112	·88	7·86	803	70	89

E—Electric trolley system. H—Horse lines. (a) Including 9,395 miles coal haulage. (b) Total expenses per passenger.

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Wallasey Corporation Tramways.—The general manager, Major R. R. Greene, in his report for the year ended March 31, 1914, states that the traffic receipts for the year under review amounted to £63,150 18s. 1d., as compared with £57,458 2s. 3d. for the previous year, showing an increase of £5,692 15s. 10d., the receipts per car-mile being 11·739d. and 10·928d. respectively, or an increase of ·811d. per car-mile, owing principally to the readjustment of the fare stages at the commencement of the financial year. The working expenses amounted to £40,490 8s., equal to 7·527d. per car-mile, as against £37,929 17s., or 7·214d. per car-mile for the former year, the increment being chiefly due to a larger amount expended in wages. The net revenue was £23,314 17s. 11d., and has been applied to the payment of interest on capital, sinking fund, instalment on loan, making together a sum of £11,122 5s. 8d., while £3,000 has been passed to depreciation and renewal fund, and a sum of £7,750 credited to the district fund in aid of rates, the balance of £1,136 1s. 2d. being carried forward. The total passengers carried numbered 13,105,204, or 743,198 in excess of the previous year, and the mileage run was 1,291,046, or an increase of 29,191 miles on the preceding 12 months.

Wigan Corporation Tramways.—In his report for the year ended March 31, 1914, Mr. F. Buckley, traffic manager, states that the results were the most successful in the history of the undertaking. The receipts amounted to £77,973, an increase of £6,704. The profit was £4,690, an increase of £3,511. Although good trade has had considerable bearing on the results, there has been a general all-round improvement in the working. Mr. Buckley alludes to the growth in receipts as an indication of what can be done in the way of promoting traffic by a careful study of somewhat exceptional circumstances. As a result of improvements in the punctual running of cars and the adaptation of services to the requiremenls of the public, the popularity of the tramway system has much increased. The receipts per car-mile averaged 12·46d., an increase of ·66d. The average total working expenses per car-mile were 7·11d., and the percentage of working expenses to receipts stands at 56·07. The receipts from parcels have increased, and the revenue from special cars amounted to over £49. The energy consumed during the year was 1·476 compared with 1·471 units per car-mile. During the year the Council granted an increase in pay to employees and reduced the hours of working from 65 to 60 per week. The Corporation has now 67 cars, and its tramway system comprises 45 miles of track.

Newcastle Corporation Tramways.—The report of the engineer and general manager of the Newcastle Corporation Tramways, Mr. Ernest Hatton, states that the Corporation now own 64 miles of track, and, including the lines leased, their cars run over a total of 69 miles of single track. The year ended March 31 witnessed still greater progress than was made in either of the two preceding years. The total number of passengers carried was 57,840,666, an increase of approximately 5,750,000. To this expansion of the business must be attributed a large part of the increase in traffic expenses amounting to £7,399. Another reason contributing to this increase are additions to the wages granted to the men during the past year. Including the payments on account of sinking fund, the percentage of profits for the year on the capital expenditure was 9·41. The Coporation now have 200 passenger cars, four motor omnibuses, one water car, and six salt and sand cars, making a total of 211 vehicles. A summary of the accounts is as follows: Total receipts, £261,000 (11·709d. per car-mile), an increase of £22,996 as compared with the previous year, working expenses £147,552 (6·614d. per car-mile), an increase of £18,533 including maintenance and repairs and public lighting expenses. Including £4,046 for interest received, there is a total balance of £117,734. Interest and loans required £31,256, rent, etc., £1,567, income tax £3,617, sinking fund and loans repaid £41,450 (equivalent to 2·45 per cent. on capital), unexpired horse tramway loans £1,469, purchase of two chassis £1,236, leaving a balance of £37,134. Of this amount £12,000 has been paid in contribution to rates, and the balance of £25,134 has been appropriated to the reserve and renewal fund, which stands at £94,337.

Great Yarmouth Corporation Tramways.—For the year 1913-14 the tramway undertaking produced a gross profit of £8,631, as compared with £7,801 in the previous year. The net profit was £1,815, and adding the amount already in the appropriation account the available balance was £2,312. A proposal to grant a 1d. in the £ in relief of the rates was lost in committee by the casting vote of the chairman (Alderman Campling), and it was resolved to transfer £1,500 to the general renewal fund. When the accounts were presented to the Council, an amendment was moved by Councillor Rivett in favour of devoting a sufficient sum to relieve the rates by a 1d. in the £. He complained that in 12 years only £1,400 had been handed over to the rates. Councillor Middleton remarked that when it was proposed a company should manage the undertaking the Council were promised a rental of £1,400 a year. Alderman Arnold, a past chairman of the committee, said that if the Corporation had accepted the offer of a company it would have cost the town considerably more than it received in rent. The tramways helped the electricity undertaking. The reserve fund must be made larger before any profits were distributed. Alderman Campling also took the latter view, and added that the first loan for permanent way was granted for 40 years, and the second for 30 years, while for cars periods of 40 and 15 years were allowed. How was the difference between 40 and 15 years to be met? With the present £1,500 they would have £10,500 in hand, and in 10 years' time they would have to find another £15,000. They needed £1,500 a year to meet this. They ought to have not less than £25,000 reserve before reducing the rates. The motion for relieving the rates was defeated by a majority of seven.

Oldham Corporation Tramways.—The general manager, Mr. J. W. Dugdale, has issued his report for the year ended March 25, 1914. The results for the past three years show a sustained and very satisfactory improvement both in gross receipts and net revenue, as will be seen from the appended summary:

	1914.	1913.	1912.
Income and working expenses—	£	£	£
Traffic receipts	114,480	108,003	101,279
Other receipts	1,689	2,574	819
Total receipts	116,169	110,577	102,009
Working expenses	78,303	73,437	71,184
Gross profits	37,866	37,140	30,914
Deficiency	—	—	2,413
Add bank interest, etc.	1,317	1,358	1,369
Sale of land	—	115	—
Balance to net revenue acct.	39,183	38,613	34,697
Establishment and other charges—	£	£	£
Interest on loans	11,138	11,829	12,004
Contributions to sinking funds	11,718	11,821	11,500
Interest to sinking funds	4,423	3,969	3,444
Rent of leased lines	5,347	5,347	5,347
Income tax deductions	1,352	1,099	1,636
General reserve fund	*4,900	*2,135	†764
Balance (deficiency) at March 25, 1912	—	2,413	—
Ditto on motor 'buses	305	—	—
	£39,183	£38,613	£34,697

* Renewals Reserve Fund account. † Purchase of Radcliffe Street property.

The average total revenue per car-mile was 13·422d. compared with 12·946d., and the average working expenses, including power cost, 9·047d., as compared with 8·598d. The car-mileage during the past year amounted to 2,077,104 (an increase of 27,188 miles): the number of passengers carried was 22,773,108 (an increase of 1,337,381). The energy consumed decreased from 1·675 to 1·585 units per car-mile, and the percentage of working expenses to receipts at 67·4 was 1 per cent. higher. Gross capital expenditure stands at £444,565, and the Corporation now has 92 tramway cars, which run over 23¾ miles of route.

Bradford Corporation Tramways.—The outstanding feature of the accounts for the year ended March 31 which the general manager, Mr. C. J. Spencer, has just submitted to the Tramways Committee, is the increase in expenditure as compared with the increase of revenue. Nevertheless the financial position as shown by the balance sheet is an exceedingly satisfactory one. The net increase of revenue is £17,353, while the net increase of expenditure is £29,749. The increase is mainly accounted for by the following items: Wages, £8,333; new car equipments, £7,644; cost of energy, £4,327; rates and taxes, £4,402; sickness payments, £2,956. The increase in wages is partly due to higher wages (£4,333), while the increase in staff, due to increase in car-mileage, has entailed an extra cost of £4,000. The percentage in the cost of labour to gross revenue has increased from 33 per cent. in 1909 to 37 per cent. In the meantime the average fare paid per passenger decreased from 1·165d. to 1·058d. The increase in the cost of new car equipments is only of a temporary character, and is due to the fact that quantities of new trucks, motors, and cars have been obtained to replace rolling stock which has become under-powered, and therefore obsolete. As regards the cost of electrical energy, its rise is attributed to the increase in car-mileage and partly to increased consumption of energy per car-mile due mainly to the running of heavier cars. A summary of the accounts is as follows:

	£ s. d.		£ s. d.
Traffic revenue	298,524 15 11	+	17,767 4 4
Sundry revenue	18,881 14 6	+	288 6 7
Total revenue	£317,406 10 5	+	18,055 10 11
Working expenses	231,151 4 4	+	30,598 18 7
Gross profit	86,255 6 0	−	12,543 7 8
Against which is charged:			
Interest on capital	16,838 11 8	−	171 5 11
Income tax	3,888 0 8	+	235 11 4
Rent of leased lines	4,259 1 9	−	29 17 11
Sinking fund	30,557 3 9	−	153 15 2
Repayment of mortgage loans	1,264 18 9	+	49 14 4
Opposition to Keighley Bill	414 11 9		
Balance of rates, 1912-13, etc.	378 13 11		
Reserve and renewals fund	11,454 3 9	−	21,467 0 0
	£69,055 6 0		
Appropriated to city fund in relief of rates	£17,200 0 0	+	8,200 0 0

The traffic revenue per car-mile was 11·486d. for tramways, and 7·281d. for the railless lines. The total car-mileage amounted to 6,206,239, and the units per car-mile to 1·924. The Corporation now has 245 tramway cars, 3 railless cars, and 13 petrol vehicles. The total number of employees is 1,356, an increase of 120 during the year.

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ALL-BRITISH "OSRAM" LAMPS.

To demonstrate the fact that "Osram" metal filament lamps are manufactured throughout at their works at Hammersmith, the directors of the General Electric Company invited representatives of the Press on Wednesday, September 23, to witness the entire process of manufacture. Some 1,500 hands are regularly employed in these works, and all the various processes, from the drawing of the tungsten wire to the exhausting and sealing of the finished lamp was shown, with the exception of the blowing of the glass bulb. After the inspection the visitors were entertained at luncheon, Mr. Ernest Byng presiding, when the speakers included the Mayor of Hammersmith and Mr. Christopher Wilson, manager of the "Osram" and Robertson works.

The "Osram" Lamp Works of the General Electric Company, Limited, are situated at Brook Green, Hammersmith, adjacent to the Robertson Lamp Works, where carbon lamps are still made in large quantities. They occupy a large building of six storeys built in the most modern style, and are equipped with the latest plant for the complete manufacture of drawn-wire tungsten lamps.

The guiding policy of the General Electric Company, Limited, is to make its manufacturing arrangements self-contained, and this policy has been carefully followed in the manufacture of "Osram" lamps. The glass bulbs and the caps, which form the raw materials of the lamp industry, are themselves supplied from other branches of the General Electric Company's enterprise. Apart from the items which are thus supplied from associated British factories, the "Osram" lamp works are independent of all outside sources for the materials required in the processes which intervene between the tungsten ore and the finished lamp.

All the glass bulbs required in the "Osram" lamp works, as well as the Robertson lamp works, are supplied by the glass works of the General Electric Company at Lemington-upon-Tyne. These works are the only ones in the country which are equipped solely for the manufacture of bulbs for electric lamps. The company have large orders in hand for lamp bulbs from other lamp manufacturers who previous to the war obtained their supplies from the Continent.

The first step in the process of manufacturing drawn-wire tungsten lamps is to obtain pure tungsten from the ore. This is done by a process of reduction which is now being carried out at the "Osram" lamp works. It results in a supply of tungsten in a finely powdered form, and the process by which this powder is worked up into a form sufficiently tough and ductile to be drawn into a fine wire is perhaps the most interesting part of the work of manufacture.

The powder is first compressed under great hydraulic pressure into the shape of a thin rectangular bar, which is maintained at a high pressure in a hydrogen flame in order to remove all impurities. A current of electricity is then passed through it, bringing it into a more solid state, and preparing it for the process of swaging, by which it is

Filament Mounting Department.

worked up into a condition suitable for drawing. The swaging is essentially a process of hammering under heat, and it results in altering the shape of the ingot to a long thin rod of ductile tungsten. This rod is then drawn down, step by step, to the required fineness. The tungsten wire is afterwards wound upon bobbins and stored for use in the factory as required.

The raw material for the stem or spider consists of glass tubes and glass rods, both of which are obtained in lengths from the Lemington Glass Works. Ingenious automatic machinery, together with a varied arrangement of gas blow-pipes, play a conspicuous part in the manufacture of the minute details which go to make up the stem with its leading-in wires and filament supports. These supports are made of nickel wire, the upper ones being thick and comparatively rigid, and the lower ones thin, so as to form a flexible spring. The upper supports are cut and formed with the necessary loop by an automatic machine, and they are inserted into the upper stud by hand. Here it is necessary that the supports should be inserted quite evenly round the stud, and this operation requires very careful work on the part of the girls employed. The spring supports are also inserted by hand to a certain extent, but a machine has now been devised which cuts and inserts a set of spring supports at one operation.

The winding on of the filament is done by hand, after which the cage is fixed into the lamp bulb, being welded to the lower part of the bulb after the exhausting stem has been fixed to the top. The exhausting department affords a very good example of the ingenious combination of machinery and hand labour. The bulbs are exhausted,

One of the Photometrical Rooms.

six or eight at a time, and the operators, who sit on trolleys running on the rails of a small tramway, are enabled to pass rapidly up and down, and supervise several sets of lamps simultaneously. After exhaustion, the bulbs are sealed off and pass into the testing department.

Samples from each batch of lamps are put through life tests, extending to 600, 1,000, and in some cases 2,000 hours. The testing racks cover a considerable area, and are controlled from a large switchboard. Every lamp is afterwards carefully tested and marked as to its candle power. The final process is the placing on of the cap and the soldering of the leading-in wires. It is worthy of note that the General Electric Company is now making its own caps, and it has for some time made the cement by which the cap is fixed to the lamp. A short final test is made of the lamp, which is branded and cleaned before being packed.

The installation of plant for the manufacture of half-watt lamps had just been completed and put into operation when the war broke out. Owing to the dislocation of labour caused by a large percentage of the staff and employees enlisting, it was found necessary to concentrate all the available hands upon the production of the ordinary types of tungsten lamp. Therefore, the manufacture of half-watt lamps could not be begun immediately, but it is confidently expected that this department will be in full swing within a month or two; indeed, spiralling machines were seen at work forming the peculiar type of filament required in the half-watt lamp.

With the additions which were completed last spring, the "Osram" lamp works will be capable of dealing with an output of between 12,000,000 and 14,000,000 lamps per annum.

Light Railway Orders.—The Board of Trade have confirmed the following orders made by the Light Railway Commissioners: Swansea Corporation Light Railways (Extension) Order, 1914, authorising the construction by the Corporation of Swansea of further light railways in that borough; North Devon and Cornwall Junction Light Railway Order, 1914, authorising the construction of a light railway in the county of Devon from Torrington to Halwill, including the reconstruction of part of the mineral line known as the Torrington and Marland Railway.

New York to Boston by Electric Car.—Particulars have been published in some of the American newspapers regarding a run which has been made by an electric street car from Boston to New York and back. The trip was made to further a project of the Bay State Railway Company to promote through traffic between the two cities especially by pleasure seekers. The run has been made possible by the recent completion of a line 30 miles long through thinly-settled country between Danielson, Connecticut, and Providence, R.I. It has been possible hitherto to travel between the two cities by electric cars, but to do so the traveller had to go by way of Springfield and Worcester. The total distance of the new route is about 280 miles each way, and two days were allowed for the trip in each direction.

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TRAMWAY AND LIGHT RAILWAY NOTES.

ABERDEEN.

PRICE OF ELECTRICAL ENERGY.

The Aberdeen Electricity Committee has recommended that for the next five years electrical energy be supplied to the tramways department at a cost of 0·85d. per unit for the first two million units, and 0·80d. per unit above this number.

BELFAST.

THE VALUE OF CAR JACKS.

A car which was proceeding up the Ormue Road recently was suddenly stopped. The conductor, on going to the front of the car, found that a dog had run under it and was fastened under the pilot board. The driver and conductor were not able to release the dog by moving the car either way. The driver got out his jack, slightly raised the wheel, and when the dog was taken from under the car it was found to be quite uninjured. Every Belfast car has always been provided with a jack and six wood blocks measuring 3 in. by 3 in. by 12 in., which are sometimes needed to pack up the jack or truck in some accidents. The jacks carried by the cars are often very useful. With their help car crews have been known to put a traction engine off the track in less than ten minutes.

BIRMINGHAM.

AN EFFICIENT LIFE-GUARD.

An accident happened in Birmingham on a recent Saturday, though happily without fatal results, when a boy was riding his bicycle along Bristol Road and the wheel skidded and threw him and his machine on to the track in front of a passing car. The driver, Samuel Shaw, promptly applied the brakes and stopped the car in its own length. The guard acted perfectly, and picked up both the lad and his machine. The boy crawled from under the car, and was uninjured, with the exception of a slight bruise, and was able to wheel his machine home. The guard was the "Save All," and the boy, Edward Gabriel, is the son of Mr. Gabriel, of Gabriel and Company, Birmingham, the patentees of the guard. This is only one of the numerous instances where life has been saved, and in no case has the guard failed when brought into action.

BLACKPOOL.

ATTEMPTED EVASION OF FARE.

It seems remarkable, in view of the smallness of the sums involved, that so many attempts should be made to travel on tramcars without paying the fare. Temptation in this direction appears to be greater in those places where season or contract tickets for the tramways are issued. In the latter part of August a man was find 20s. and costs, or 28 days' imprisonment, at Blackpool Police Court for attempting to avoid payment of a tramway fare. It appeared that he pretended to the conductor that he had a contract ticket, and when asked to produce it he was unable to do so. He also gave a false address.

BRADFORD.

NEW TRUCKS AND BRAKES—PAYMENT OF FARES ON PLATFORMS.

In his annual report the general manager of the Bradford Corporation Tramways mentions that the Tramways Committee have decided to scrap the trucks and equipments of about 100 cars purchased between 1898 and 1900, and to replace them by new trucks and brakes of a departmental design. These brakes were described in our issue of May 7, 1914. The cars will be built by Hurst, Nelson, and Company, Limited, of Motherwell, and will be equipped with 50-H.P. motors, manufactured by Siemens Brothers and Company, Limited. The general manager is of opinion that the payment of fares on the platform, which was adopted some time ago in Bradford, has had a very considerable effect in preventing accidents to passengers when alighting from or boarding cars while in motion. In nearly all cases these accidents are due to carelessness on someone's part, and the presence of the conductor on the platform is undoubtedly an advantage.

CROYDON.

NEW TRAMWAY TRACK.

An estimate of £2,550 for constructing a short double line of tramway track in Selhurst Road, Croydon, has been approved by the Town Council.

DONCASTER.

NEW CARS TO BE PURCHASED – SUNDAY SERVICE.

The tramways manager, Mr. E. S. Rayner, has been instructed by the Tramways and Electricity Committee to prepare specifications for four new tramcars.—The experiment of running cars on Sunday in Doncaster appears to be proving successful. Since the war broke out an enormous number of people visit the town on Sundays, so that the running of the cars, though objected to by some of the citizens, has really become a necessity.

DUBLIN.

THROUGH RUNNING.

It was reported at the recent meeting of the Dublin and Blessington Tramway Company, that good results had ensued from the through running arrangement with the Dublin United Tramway Company for goods traffic. Owing to their uneconomic system of

AN IDEAL ARRANGEMENT.

A "PEACOCK" IMPROVED BRAKE AND A CAST-IRON PEDESTAL FOR SPINDLE.

THE "PEACOCK" BRAKE CO., 27, Clements Lane, LONDON, E.C.

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traction they did not propose in future to run such a large passenger service until electric traction had been adopted.

GLASGOW.

Opening an Extension.

A new tramway route from Battlefield Road along Sinclair Drive, Glasgow, was inaugurated on September 6. Although the line is only a short one it will be of convenience to a large population in the neighbourhood.

LEEDS.

Construction of New Lines.

The construction of new tramways at Nippet Lane, Halton, and Guiseley will shortly be commenced. This work will find employment for from 70 to 100 men for a period of three months at an average wage of 30s. per week. Powers have also been secured for the laying of several other lines. Paving in different districts is already providing work for over 400 men, and a further 100 can be set at work when required. The Road Board have recently made a grant of £20,000, which will be used for macadamising a number of the chief thoroughfares. A big service reservoir can also be put in hand, and other work is being considered. The relief work is in the hands of a special committee, and Mr. J. B. Hamilton, commercial manager of the city, is acting as the executive to the committee.

LEICESTER.

Extension to be Carried Out.

At a recent meeting of the Council a resolution was passed instructing the committee to bring forward any work that could be done at the present time. On September 7 Mr. Flint, chairman of the Tramways Committee, submitted proposals recommending tramway construction work involving an expenditure of £30,000, of which about £9,000 would be spent on labour. A good deal of the work would be suitable for men likely to be thrown out of employment. It was not intended to proceed with the extensions at once, as they would have to place a number of contracts which would take two or three months to arrange, and the work would probably not be begun until the end of the year. The proposals were approved.

LONDON.

New Line over the Widened Kingston Bridge.

The new tramway line of the London United Tramways Company over the widened Kingston bridge has been opened for traffic. The making of the connection of the line with the existing track at both ends of the bridge was carried out with great expedition during the early hours of a Sunday morning.

MAIDSTONE.

Permanent Way Maintenance

At the last monthly meeting of Maidstone Town Council much discussion took place on a proposal by the Highways Committee that in future the work of maintaining the track should be taken over by that committee, and that the Tramways Committee should contribute £250 annually towards the cost. Ultimately the matter was referred back to the Highways Committee for an estimate of the amount of the yearly expenses involved.

SALFORD.

Doubling a Tramway.

Salford Town Council propose to borrow £12,000 for laying a double line of tramway in Camp Street, Broughton.

SHEFFIELD.

Tramway Proving more Serviceable than Ever.

At a meeting of Sheffield City Council, Sir William Clegg, in moving the adoption of the tramway report and accounts, a summary of which is given in this issue, said that during the year the department had made greater progress and was of more public utility than at any time since electric traction was inaugurated in the city. The large increase in the mileage caused by running excess cars in order to avoid overcrowding at busy times of the day had resulted in a decrease of ½d. per car-mile in the traffic receipts. The fares were such that on an average over 2¾ miles could be travelled for 1d. If this distance went on increasing by the extension of the tramway termini, and the average fare, on the other hand, continued to decrease, the result would be that the actual profit available for the rates could not in future show a very appreciable increase. The Council and the public must rest content with a decreased amount of profit if they were to give increased facilities, a principle with which he entirely agreed, subject to certain limitations.

YORK.

Extensions—Cottages for Tramway Employees.

Tenders for the construction of the proposed light railway on the Hull Road route are to be obtained as soon as the necessary plans and specifications have been prepared. The Tramways Committee have instructed the manager, Mr. Hame, to report on the equipment of the railless trolley routes authorised by the Corporation Act of this year, and to obtain quotations for the supply of motor omnibuses, including two electric omnibuses. York City Council on September 14 adopted a proposal to erect 28 cottages for tramway workmen. The estimated cost is £6,851, and the annual charges are estimated at £455, which will necessitate a rental of 6s. 3d. per week per cottage.

PATENT LIST.

Specially abstracted for "The Tramway and Railway World" from the Official Journal of Patents.

*** If the inventions have been communicated the names of the communicators are given below in *italics*.

Applications.

The following Applications for Letters Patent have been filed:

19,269 Steam superheaters—G. V. V. Hutchinson and R. E. L. Maunsell.
19,300 Electrical railway signalling—J. Gardner.
19,341 Automatic device for the prevention of collisions on railways—G. G. Mathwin.
19,399 Keys for holding down railway and tramway rails in their supporting chairs—L. Green.
19,484 Devices for supporting and insulating conductors—P. Good and A. E. Woodhouse.
19,513 Brakes—C. Dutcher.
19,532 Travelling trolleys for overhead tracks—H. Morris, Limited, and J. A. Butterworth.
19,534 Running indicator for railway rolling stock, tramcars, and omnibuses—G. W. Holford.
19,536 Tram axle bearers—G. T. Jones.
19,581 Life-guards—J. A. Mathews.
19,637 Terminals for electrical conductors—A. J. Hedgcock, E. C. Mann, and W. T. Henley's Telegraph Works Company, Limited.
19,663 Contact mechanism on railway tracks and trains for applying brakes, etc.—J. G. Douglas.
19,668 Safety appliances for motor omnibuses—R. Bonfield.
19,697 Direction indicator—B. King.
19,794 Electro-magnetic switches—British Thomson-Houston Company, Limited *(General Electric Company)*.
19,833 Means for lubricating axles of locomotives, carriages, tramcars, etc.—H. Hobson and A. Morris.
19,869 Trolley head for tramcars—A. S. O'Fflahertie.
19,879 Automatic railway signalling—J. Drinkell and W. Evans.
19,944 Electrical system for transferring cars—T. F. Mullaney.
19,950 Signalling apparatus for railways—S. Hue.
19,977 Electric lighting and heating of railway vehicles—C. H. Vidal.
20,006 Electrical railway signalling—J. Gardner.
20,046 Municipal traffic control system—J. B. Loge.
20,077 Control systems for electric motors—The British Thomson-Houston Company, Limited *(General Electric Company)*.
20,094 Conduits for electric conductors—J. W. Manley and W. J. L. Sandy.
20,115 Portable railway tracks and vehicles therefor—C. Boyle.
20,135 Car trucks—W. S. Adams.
20,136 Sleepers for permanent way—C. P. Sandberg.
20,166 Attaching fish plates to tramway rails—L. M. Fox.
20,173 Passenger train communication system and apparatus—G. H. Willans, E. S. Luard, and Consolidated Brake and Engineering Company, Limited.
20,177 Speed indicators—E. A. Gresens and A. W. Faerber.
20,197 Apparatus for controlling traffic on railways—Railway Signal Company, Limited, and J. F. Wolff.
20,244 Car lighting apparatus—W. I. Thomson.

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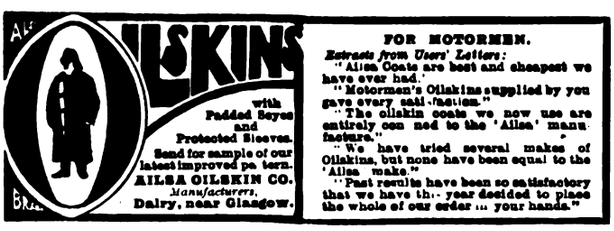

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Specifications Published.

1913.

5,925 Clutch and brake mechanism—De Rusett.
13,682 Centralised selective device for operating and locking point rails and signals—Franchimont and Cesar.
18,008 Train electric control systems—Starie.
18,019 Automatic signalling and alarm systems for railways—De Munnick.
18,664 Vacuum brake apparatus—Luard.
22,683 Ground levers for railway points—Wilkinson, Ridley, & Ridley.
23,205 Railway signalling—Evans, Evans, and Watkinson.
16,606 Detonator apparatus for railway signalling—Ward.
18,790 Construction in connection with anti-friction mechanism as applied to the axle shafts of tramcar trucks—Cooper.
18,949 Automatic train stops—Haddon (*Railway Automatic Safety Appliance Company*).
21,583 Life-guards Turnbull and Mounsey.
24,193 Signalling and interlocking for railways and tramways—McKenzie and Holland, Limited, and Edmonds.
25,234 Wind and weather screens for tramcars—Morris.
25,363 Electrical conduit systems—Railing and Taylor.
25,671 Vacuum brake apparatus for railway vehicles—Gresham and Kiernan.
25,790 Insulating covering for overhead wires—Vaughan.
27,226 Automatic control mechanism for the engines and brakes of railway trains—Browne.
19,019 } Train signalling and control systems—Prentice and Starie.
19,020 }
20,618 Automatic railway signalling—Mumford.
21,584 Omnibus seats Best and Hill.
27,296 Brakes—Birks.
28,270 Vacuum brake apparatus Luard.
19,528 Reversible seats for roofs of tramcars and omnibuses—Page.
19,842 Automatic brake adjuster for tramcars—Peckham and Thomas.
19,948 Fluid-pressure braking apparatus—Cloud.
21,888 Means for automatically stopping a train in the event of the signals being passed when in the "danger" position—Lomas.
22,609 Means for supporting tramway rails—Robins.
22,867 Railway signalling apparatus—Capstick, Dawson, and Whelon.
26,198 Pulleys for the trolleys of electric railways and tramways—Welsh.
26,638 Combined signalling and indicating and train-arresting devices for railways—Peacock.
27,475 Systems and apparatus for the automatic control of the speed of vehicles moving on line trackways—Simmen.
28,691 Suspension devices for brake blocks—Anger.

1914.

4,255 Train stopping devices—Roberts.
9,932 Laying of setts with respect to tramway lines or rails, and blocks or sections to be used in such connection—Shepherd.
3,679 Rails—Baum.
8,560 Traction wheels—Summerscales.
15,607 Motor traction wheel—Church.

TRAFFIC RETURNS.

Colonial and Foreign Tramways.

NAME OF COMPANY.	1913. WEEKS ENDED. Sept. 6.	Sept. 13.	Sept. 20.	Sept. 27.	1914. WEEKS ENDED. Sept. 5.	Sept. 12.	Sept. 19.	Sept. 26.	AGGREGATE. Wks.	1914.	Increase or Decrease.
	£	£	£	£	£	£	£	£		£	£
Anglo-Argentine	53,074	56,592	50,188	56,344	45,897	53,640	51,235	49,012	39	2,069,290	− 31,400
Auckland ... ... (28 days	19,543	...	...	...	21,046	...	...	...	8½	44,357	+ 2,747
Brazilian Street ... (month) Mlrs.	...	...	...	...	...	...	...	...	—	—	—
Brazilian Traction...	...	...	...	...	...	...	...	...	—	—	—
Brisbane ... ...(month)	29,970	...	...	...	33,172	...	...	...	35	231,827	+ 24,649
British Columbia ... (month) $	...	...	...	...	...	...	...	...	—	—	—
Buenos Aires Port and City (month)	..	..	...	...	...	...	...	...	—	—	—
Buenos Ayres Lacroze ...(month)	...	...	...	...	...	...	...	...	—	—	—
Calcutta ... ... Rs.	71,278	70,506	81,096	70,896	68,947	66,296	66,051	66,575	38	26,21,257	+104,075
Cape Town ... ...(month)	...	...	..	...	...	...	...	...	—	—	—
Carthagena and Herrerias (month)	2,192	...	...	...	2,758	...	...	...	35	18,970	− 4,347
Cordoba ... ...(month)	13,691	...	...	...	13,371	...	...	...	21	69,583	+ 2,201
East India ... ...(month)	2,005	...	...	...	2,112	...	...	...	4	2,112	+ 107
Kalgoorlie ... ...(month)	...	...	...	...	...	...	...	...	—	—	—
La Plata ... ...(month)	...	...	...	...	...	...	...	...	—	—	—
Lima ... ...(month)	33,939	...	...	...	29,800	...	...	...	35	271,607	+ 5,102
Madras ... ... Rs.	(2 weeks)	29,097	(2 weeks)	24,881	(2 weeks)	27,257	(2 weeks)	24,354	38	517,249	+ 33,066
Manaos ... ... (month)	...	...	...	...	...	...	...	...	—	—	—
Melbourne ... ...(month)	...	...	...	...	...	...	...	...	—	—	—
Mexico ... ... (month) $	635,445	...	...	...	687,593	...	...	...	35	4,846,344	+334,757
Montevideo ... ...(month)	28,829	...	...	...	26,075	...	...	...	44	309,738	− 6,693
Para ... ... (month)	24,485	...	...	...	19,354	...	...	...	39	189,946	− 38,540
Port Elizabeth ... ...(month)	...	...	...	...	...	...	...	...	—	—	—
Puebla ... ... (month) $	...	...	...	...	...	...	...	...	—	—	—
Rangoon ... ...(month)	4,639	...	...	...	4,629	...	...	...	35	41,938	+ 1,356
Rio de Janeiro	...	...	...	...	...	...	...	...	—	—	—
Shanghai ... ... $	...	...	...	...	...	...	...	...	—	—	—
Singapore ... ... $	...	...	...	...	...	...	...	...	—	—	—
Toronto ... ... (month) $	...	...	...	...	...	...	...	...	—	—	—
Winnipeg ... .. (month) $	...	...	...	...	...	...	...	...	—	—	—

(Continued on page 284).

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TRAFFIC RETURNS—*continued.*

Tramways and Omnibus Undertakings in the United Kingdom.

NAME OF COMPANY OR CORPORATION.	1913. WEEKS ENDED.				1914. WEEKS ENDED.				AGGREGATE.		
	Sept. 6.	Sept. 13.	Sept. 20.	Sept. 27.	Sept. 5.	Sept. 12.	Sept. 19.	Sept. 26.	Wks.	1914	Increase or Decrease.
	£	£	£	£	£	£	£	£		£	£
Aberdeen Corporation	1,896	1,707	1,644	1,700	1,723	1,593	1,548	1,508	17	29,884	+ 554
Accrington Corporation	615	580	557	571	485	496	492	509	25	14,634	- 6
Ayr Corporation	382	383	932	351	349	334	413	284	19	9,148	- 729
Bath Electric	1,379	1,238	1,199	1,113	1,104	1,147	908	1,059	38	38,097	+ 561
Birkenhead Corporation	1,282	1,259	1,314	1,450	1,339	1,252	1,247	1,258	25½	33,220	- 796
Birmingham Corporation	11,703	12,072	12,201	13,094	11,372	11,301	11,438	11,685	26	315,384	+ 16,052
Blackburn Corporation	1,476	1,532	1,261	1,421	1,221	1,275	1,244	1,407	26	36,112	+ 1,250
Blackpool Corporation	4,296	4,499	3,106	2,589	2,627	2,550	1,620	1,808	26	56,759	- 8,168
Bolton Corporation	3,211	2,698	2,780	2,801	2,982	2,914	2,597	2,521	26	73,633	+ 1,765
Bournemouth Corporation	2,817	2,534	2,387	2,203	2,123	1,987	1,877	1,864	26	58,178	- 2,855
Bradford Corporation	5,893	6,391	5,743	5,995	5,870	5,877	5,750	5,725	26	164,621	+ 8,378
Brighton Corporation	1,377	1,368	1,254	1,272	1,378	1,276	1,102	1,160	25½	31,951	+ 8
Bristol	9,201	8,710	9,079	8,497	9,377	8,827	8,693	8,326	38½	333,369	+ 19,829
British Electrical Federation	52,364	54,939	53,780	...	58,475	56,498	49,637	...	—	—	—
Burnley Corporation	1,688	1,984	1,660	1,791	1,396	1,469	1,405	1,352	26	42,306	- 2,661
Burton-on-Trent Corporation	298	296	296	304	301	301	295	285	26	7,965	+ 296
Bury Corporation	1,445	1,377	1,420	1,462	1,877	1,483	1,361	1,319	25½	37,613	- 1,683
Cardiff Corporation	2,906	2,959	2,711	...	2,877	2,862	2,710	...	24	71,575	- 1,954
Chatham and District	992	1,020	1,031	1,020	1,138	1,165	1,041	1,040	38	36,351	+ 741
Chesterfield Corporation	253	256	257	258	259	248	241	241	24	7,138	+ 470
Colne Corporation	308	350	269	298	233	230	244	204	—	—	—
Cork Electric	558	563	501	530	544	549	485	489	38	19,344	+ 56
Croydon Corporation	1,530	1,642	1,715	...	1,775	1,719	1,575	...	24	44,125	+ 2,584
Darlington Corporation	245	258	250	268	285	291	276	262	26	7,024	+ 486
Derby Corporation	1,083	996	966	1,065	1,012	1,017	973	943	25½	27,004	+ 983
Dover Corporation	299	302	275	288	286	283	266	261	26	6,889	- 183
Dublin and Lucan	157	143	119	119	157	154	132	150	12½	2,063	- 108
Dublin United	2,917	3,111	3,162	3,310	6,055	6,027	5,585	5,662	38	226,378	+ 6,484
Dundee City	1,424	1,331	1,308	1,326	1,285	1,293	1,259	1,214	16½	24,936	- 87
East Ham Corporation	968	985	981	984	1,255	1,234	1,200	1,158	25½	29,144	+ 3,475
Exeter Corporation	379	404	369	366	397	377	356	343	26	9,635	+ 248
Gearless Motor 'Buses	537	631	605	...	573	539	502	...	38	18,019	+ 6,575
Glasgow Corporation	20,458	20,439	20,873	21,110	20,342	20,609	20,042	19,683	16	342,791	+ 7,875
Glossop (Urban Elec. Supply Co.)	134	148	142	136	112	125	119	112	39	4,900	- 173
Halifax Corporation	2,228	2,216	2,163	2,180	2,212	2,310	1,977	2,091	25	58,416	+ 3,040
Hastings and District	1,557	1,498	1,408	1,275	1,307	1,263	1,041	1,002	38	40,376	- 2,327
Huddersfield Corporation	2,094	2,362	2,048	2,328	2,234	2,503	2,187	2,413	26	81,756	+ 6,066
Hull Corporation	3,053	3,089	3,126	3,201	2,931	3,051	2,984	2,945	26	80,798	+ 352
Ilford U.D. Council	439	460	445	457	618	594	577	561	25	14,653	+ 2,825
Ilkeston Corporation	142	140	138	147	130	125	122	125	26	3,513	- 96
Ipswich Corporation	526	570	536	535	496	475	427	429	26	12,790	+ 104
Isle of Thanet	1,593	1,514	1,076	981	1,191	1,115	915	735	51	33,422	- 3,215
Kilmarnock Corporation	169	168	177	171	155	147	157	147	19	3,293	- 239
Lanarkshire	1,839	1,815	1,673	1,834	1,919	1,900	1,750	1,776	38	72,284	+ 8,160
Lancashire United	1,879	1,808	1,736	1,662	1,680	1,793	1,566	1,616	38	63,373	+ 4,667
Leeds City	8,196	8,534	8,605	8,566	7,683	7,831	7,765	7,677	26	47,832	+ 2,678
Leicester Corporation	2,835	2,844	2,827	3,136	2,706	2,681	2,612	2,651	39	111,448	+ 3,333
Leith Corporation	729	706	707	767	701	681	648	685	19	14,594	+ 322
Leyton U. D. Council	1,305	1,359	1,323	1,397	1,443	1,429	1,297	1,265	24	34,914	+ 1,771
Liverpool Corporation	13,170	13,290	12,924	13,554	13,236	13,265	12,922	12,916	38½	510,373	+ 12,621
Llandudno and Colwyn Bay	805	681	515	374	493	465	393	328	43	13,974	- 1,951
London County Council	40,341	41,866	42,339	43,208	43,068	43,541	42,526	41,976	25	1,106,334	+ 50,009
London General Omnibus	...	...	...	...	...	...	...	...	—	—	—
London United	6,091	6,759	6,705	...	6,557	6,249	5,572	...	38	236,808	- 2,559
Lowestoft Corporation	403	335	279	243	282	248	210	192	51	11,252	- 16
Maidstone Corporation	210	218	231	231	219	224	221	226	26	5,788	- 297
Manchester Corporation	17,968	17,787	17,227	18,871	17,035	16,777	16,330	16,582	26	454,881	+ 230
Metro. Electric Tramways	8,985	9,540	9,468	...	9,192	9,168	8,176	...	38	345,052	+ 4,025
National Steam Car	3,358	3,788	3,695	5,152	4,819	4,372	4,183	5,972	47	205,830	+ 74,543
Nelson Corporation	214	251	190	238	152	162	158	148	25½	5,268	- 381
Newcastle-on-Tyne Corporation	4,768	4,863	4,883	5,158	5,716	5,787	5,765	5,646	26	139,288	+ 14,237
Newport (Mon.) Corporation	820	802	804	...	871	828	817	...	25	21,277	+ 2,061
New St. Helens and District	935	890	828	816	1,093	1,089	996	992	12	12,274	+ 790
Northampton Corporation	626	579	597	800	638	647	615	595	25½	15,407	- 2
Nottingham Corporation	3,354	3,311	3,394	3,406	3,244	3,258	3,207	3,130	25½	88,135	+ 2,796
Oldham Corporation	1,982	2,204	2,217	2,401	2,851	1,957	2,005	2,039	27	61,830	+ 1,975
Portsmouth Corporation	...	2,818	2,440	2,478	...	2,592	2,326	2,277	26	66,801	—
Preston Corporation	954	885	871	872	937	1,055	1,032	958	26	24,362	+ 1,093
Provincial	2,392	2,425	2,187	2,137	2,344	2,291	2,070	2,103	51	101,509	+ 1,736
Reading Corporation	740	746	690	741	751	746	716	650	25	18,727	+ 761
Rhondda Tramways	1,275	1,284	1,235	1,310	1,308	1,261	1,183	1,222	38	47,522	+ 1,856
Rochdale Corporation	1,761	1,680	1,561	1,665	2,036	1,944	1,484	1,465	26	44,122	+ 1,588
Rotherham Corporation	1,027	1,038	1,015	1,062	1,095	1,097	1,089	1,151	26	27,323	+ 1,191
Salford Corporation	5,604	5,206	5,162	5,526	5,357	4,632	4,682	4,859	25	133,686	— 3,220
Sheffield Corporation	7,414	7,488	7,538	7,800	7,468	7,329	7,380	7,660	26	206,708	+ 7,136
Southampton Corporation	1,489	1,462	1,451	1,489	1,423	1,404	1,263	1,209	25	35,728	+ 706
Southend-on-Sea Corporation	1,436	1,292	1,257	1,086	1,451	1,375	1,162	968	26	30,826	+ 2,706
South Metro. Tramways	1,045	1,211	1,228	...	1,193	1,163	1,071	...	38	42,045	+ 8,049
South Shields Corporation	728	752	700	749	756	737	727	696	25½	20,733	+ 1,620
Sunderland Corporation	1,568	1,426	1,475	1,559	1,557	1,448	1,354	1,378	26	40,091	+ 1,242
Swindon Corporation	178	182	172	183	193	187	179	179	25	4,654	+ 346
Torquay Tramways	1,121	1,006	840	748	690	612	550	532	38	22,673	— 3,112
Tramways (M.E.T.) Omnibus Co.	7,395	9,130	8,928	...	9,291	8,034	5,256	...	38	336,230	+ 183,768
Tyneside Tramways and Tramroads	534	543	513	517	765	817	739	716	13	8,107	+ 1,163
Wallasey Corporation	1,335	1,294	1,186	1,236	1,355	1,323	1,259	1,178	25½	35,121	+ 1,721
Walsall Corporation	607	628	626	663	606	626	615	605	39	24,334	+ 207
Walthamstow U.D. Council	707	801	749	797	890	833	752	738	26	22,099	+ 2,287
Warrington Corporation	432	435	437	455	426	432	438	426	25	11,200	- 149
West Ham Corporation	2,638	2,718	2,701	2,783	2,850	2,822	2,764	2,664	25	72,982	+ 3,247
Wigan Corporation	1,495	1,523	1,461	1,571	1,401	1,418	1,385	1,405	25	37,693	- 138
Wolverhampton Corporation	1,048	1,074	1,072	1,187	1,005	964	932	1,022	27	28,418	- 510
Yorkshire (West Riding)	1,417	1,468	1,465	1,653	1,463	1,394	1,386	1,361	39	56,950	+ 263

ELECTRIC RAILWAY TRAFFIC RETURNS.

Owing to the European war, the Government have taken over the railways of Great Britain as from August 4, and the issue of traffic returns has been suspended. Consequently the traffic returns of the electric railways which usually appear on this page cannot be given.

TRAMWAY DIRECTORIES.

A useful feature of this issue is the directory of electric railways and electric tramways which will be found among the advertising pages. This directory contains the names of the chief officials and the principal particulars relating to each undertaking.

The directory is revised as occasion requires, and is the most up-to-date and comprehensive list published.

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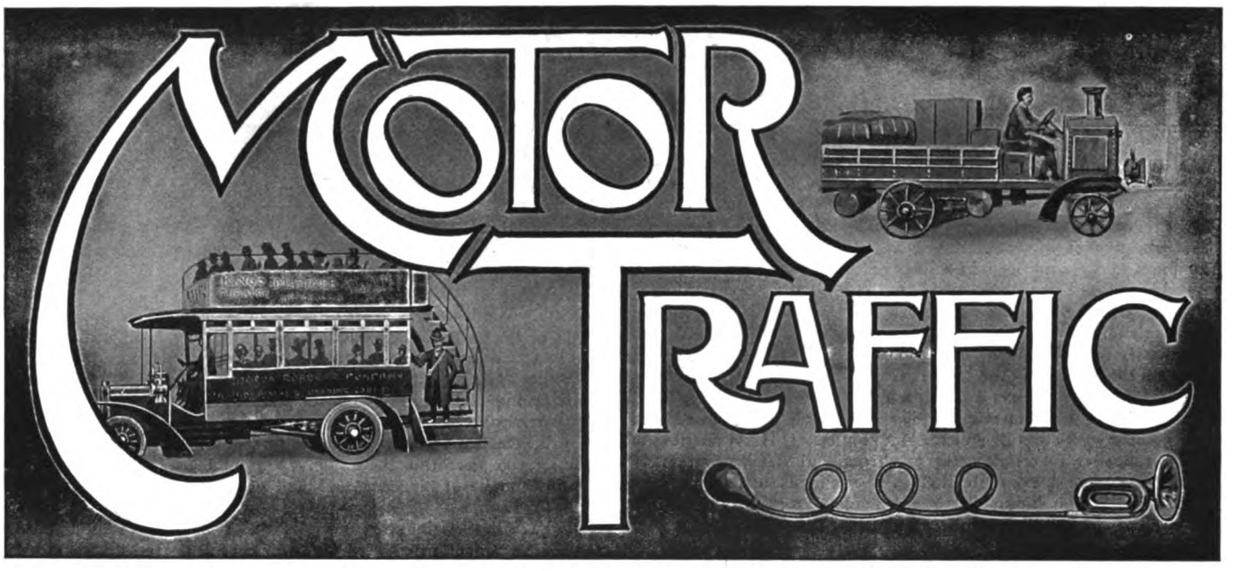

The determined attempts that have been made to direct the attention of British manufacturers to the possibilities of extending their sphere of influence in consequence of the fact that German competition is for the time being dead, cannot at the moment be said to have met with great success. In order that the full advantage of the present situation shall be gained, it appears to us that definite plans of a far-reaching character should be made which will ensure, first, that the actual requirements of the prospective purchaser, not only in the United Kingdom, but in our Dominions over sea, shall be ascertained, and, secondly, that the possibilities of our British factories shall be made known in a manner that will leave no doubt in the minds of the purchaser that in the British market he can obtain all he requires, and this upon fair trading conditions. The fact that each of the known firms who manufacture the heavier type of industrial motor vehicle are working night and day in order to cope with the Government demands upon their resources can be taken as some excuse for neglecting, for the time being, the opportunities of the present situation, but even here the extreme importance of the case should certainly call for special effort. Travellers abroad tell us that all the world over the British-made article is the one most desired, but for various reasons foreign substitutes are commonly purchased; surely the time has now arrived when, with the assistance of the patriotic wave which is stirring the whole of the British Empire, the admittedly superior British commercial chassis should come into its own. To bring about this highly-desired result, however, it is essential that the situation should be viewed in the broadest possible light, and that the questionable practice of raising prices, freight charges, etc., which have been brought to our notice, in order to take advantage of the immediate pressure, should give way to a wider policy which will, we are confident, pay best in the long run.

In the municipal field the fact that large numbers of horses have been commandeered, and in consequence the cleansing departments have been more or less disorganised, should at once encourage the manufacturers of reliable steam vehicles to study the requirements of the various localities in order that they may be in a position to convince the authorities that mechanical traction for municipal services has very distinct advantages over the older methods. We readily admit that much has been done in this direction under normal circumstances, but the present conditions are far from being normal, and, therefore, special efforts must be made if the full advantage to be gained by both parties is to be assured. Until rudely awakened by the outbreak of the war, and its consequent interference with the smooth working of their various departments, the majority of the Corporations have been content to continue along the old lines with their costly and cumbersome systems of horse traction. Now, however, they are prepared to consider the newer methods, and we feel convinced that if a decided effort is made to bring the real facts before the right people, the result will be eminently satisfactory both to the ratepayers and the mechanical traction industry.

There should be no difficulty in securing contributions for investigation of the possibilities of alcohol as a fuel. With the influential support the fund for the purpose has already received, it is not unreasonable to expect that both the Colonial and the War Office will contribute in a generous way. While the matter is of importance to the Colonies, now becoming largely interested in motor transport, it is of vital concern to the War Office; for motor vehicles, as experience of the past few weeks has demonstrated, are now essential for military purposes, a circumstance that justifies an appeal being made to the Department for a monetary contribution. The matter ought also to receive the attention of the Development Commission in the interests of British agriculture, which stands to benefit largely if it can be shown that potatoes and other crops can be profitably grown for the distillation of the spirit. There is every reason why the departments referred to should set an example in financially supporting the appeal, for it is estimated that the minimum funds required by the committee will be £30,000, or £6,000 per annum for a period of five years. It is of the utmost importance to users of public service and commercial motors that the cost of petrol should not again reach the high figure which prevailed little more than a year ago. That it has fallen of late is due largely to the activity of private motorists in forming syndicates to work additional sources of petrol supply, and also to the success of the efforts that have been made to secure benzol from coal and other sources. Increasing supplies may be anticipated from these processes, but it is a matter of national importance that the possibilities of alcohol production should be investigated to the fullest extent. It will not be a difficult matter to adapt motor engines for the consumption of alcohol, and doubtless this will constitute an important part of the Alcohol Fuel Committee's work.

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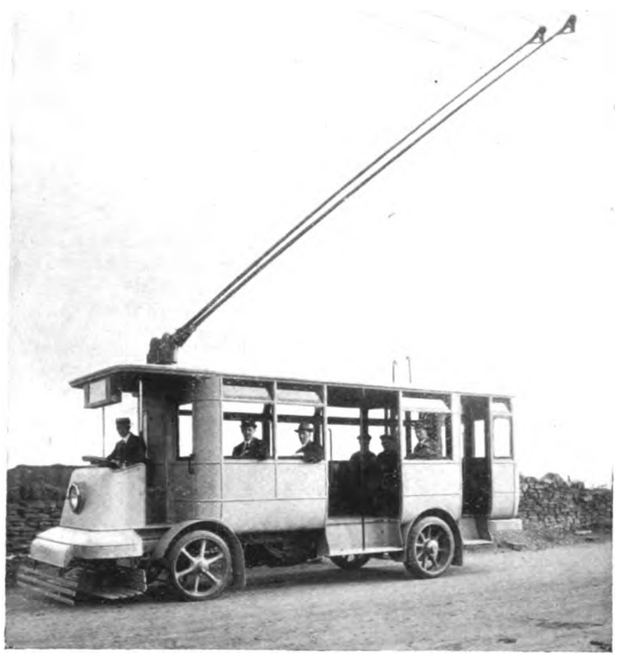
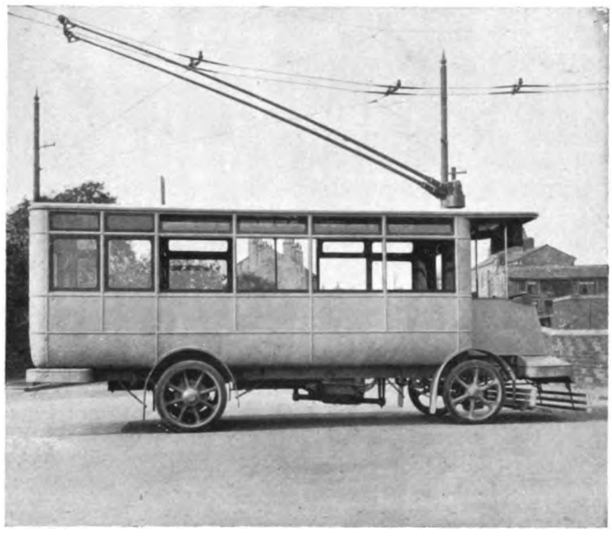
MOTOR TRAFFIC.

"R.E.T." CARS WITH CHAINLESS DRIVE.

The accompanying illustrations are of the latest type of passenger trolley omnibus built by the R.E.T. Construction Company, Limited, of London and Leeds. These vehicles are part of a fleet of trolley 'buses which have been constructed by the company for operation in Shanghai, and differ from the vehicles illustrated in our issue of June 4 as regards the drive.

The chassis is of the new "D" type, referred to lately as having been put on the market by the R.E.T. Company, and is equipped with the chainless or single-worm drive in which the construction has been reduced to the simplest form yet made and which under prolonged tests of great severity has given excellent results. It is not possible in this brief reference to touch upon constructional details, but many improvements have been embodied in the chassis apart from the general design, which has undergone some changes resulting from the extensive experience which has been gained by the company and after careful experimental work. The body construction is of a special character which combines great strength with light weight.





"R.E.T." Omnibuses with Chainless Drive for Service in Shanghai.

The photographs show that the general lines of the vehicles are somewhat different in character to what we are accustomed to in this country, due to the unusual traffic conditions for which the service of trolley 'buses were built.

The large combined entrance and exit at the side of the vehicles, as well as the general design of the body, is a feature which could, of course, be varied to meet the requirements of other traffic.

It will be noticed that life-guards have been fitted, and they have undergone satisfactory tests. Side-guards have also been provided to "protect" the rear wheels, but these were removed for the purposes of the photographs.

The vehicles are constructed to seat 28 passengers with standing accommodation for a further 28, making a total of 56 passengers. Two compartments are provided, the larger with standing room being for native passengers and the other for Europeans.

The trolleys are the latest design of "R.E.T." under-running type, and are more compact and lighter than hitherto, whilst all the advantages of this special trolley in permitting the widest deviations of the vehicle in passing other traffic and absence of side pull on the trolley wires are retained.

Owing to the density of the traffic through which the cars run and the fact that along parts of the route they actually interrun with tramcars, they have been constructed with buffers at front and rear somewhat similar to an ordinary tramcar.

THE B.T-H. MAGNETO.

A new magneto of British manufacture for use on petrol engines, gas engines, etc., will shortly be placed on the market in quantities by the well-known electrical engineering firm, The British Thomson-Houston Company, Limited, of Rugby. This magneto is manufactured at the Coventry Works of the British Thomson-Houston Company, and is the result of over a year's systematic experimenting, both in laboratories and in actual practice on the road and elsewhere. It has demonstrated its ability to stand up triumphantly under the severest service conditions. In designing and building this magneto the company has brought its vast electrical experience to bear upon the subject, and has followed, with the greatest care, the accepted line of magneto manufacture and practice, so that the B.T-H magneto is interchangeable with the standard make of magneto, and will give equally satisfactory, if not superior, results.

No branch of engineering manufacture requires more accurate work than the production of magnetos, and in view of the fact that this company is one of the largest manufacturers of electrical apparatus, and has been engaged for many years in constructing electrical machines in which the highest grade of workmanship is essential, they are placed in an exceptionally favourable position to manufacture and supply reliable magnetos.

As the general design of the B.T-H. magneto follows the line of standard magneto manufacture, its adoption will entail no change whatever in standard practice. The machining of the magneto is on a very high level of accuracy, the fits of the majority of parts being absolute, and where limits are allowed they are reduced to less than a thousandth of an inch. This high level of accuracy is obtained by the use of special jigs and limit gauges, over 3,000 of which are required.

Like most modern magnetos, the B.T-H. has a base and end plates of aluminium, and is totally enclosed and weatherproof. There is a fine gauze protection cover over a small opening in the top of the magneto which enables air to reach the armature, so as to dissipate any vapour which may be formed. The magnets are made longer than is usually the case with most magnetos, this resulting in a more permanent magnet, and a hotter spark at low speeds.

As the British Thomson-Houston Company have for years manufactured electrical instruments in which the variation of the permanent magnetic field may not exceed 0·1 per cent., whereas a variation of 10 per cent. will not seriously affect the operation of a magneto, there should be no anxiety whatever regarding the permanency of the magnets used in the B.T-H. magneto, which are manufactured from a special grade of tungsten steel possessing great retentivity.

The armature is neat and compact, the condenser being contained in a brass cap at one end of the core; its dielectric consists solely of pure mica sheets, and here again the electrical experience of the British Thomson-Houston Company in the manufacture of condensers has been of valuable assistance. The condensers in the B.T-H. magneto are scientifically proportioned, so that long life to the contacts is assured.

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MOTOR TRAFFIC.

The armature shaft is mounted on ball bearings, the greatest care having been exercised to ensure good lubrication, while at the same time totally excluding oil from the windings. The insulation of the armature windings is a matter which requires careful attention, in view of the high electrical pressures to which it is subjected, and here again the wide experience of the British Thomson-Houston Company has been invaluable, they having been the first in the United Kingdom to insulate the armatures on their large electrical machines in a thoroughly satisfactory manner by means of vacuum impregnation, and having on their staff expert engineers who are recognised as leading authorities in reference to armature insulation.

In order that high-voltage windings may be thoroughly reliable they must be impregnated or "filled" with a supplementary material which occupies all the interstices, so that the coils become solid impervious masses. To accomplish this the coils, after they are wound, are frequently treated with a bituminous or resinous material, liquified by heat and forced into the windings under pressure. Such treatment, however, is unsuited to windings rotated at high speed, as the prolonged effect of warmth and centrifugal force will cause such filling material to gradually work out again. A very effective treatment which avoids this defect is found by employing as filling material an insulating substance which cannot subsequently soften. After winding, the coil is covered with a heavy jacket of suitable insulating material which by subsequent treatment is converted into a homogeneous waterproof unit. As an additional safeguard for the armature insulation a safety spark gap is provided, which, in the event of the voltage rising to an abnormal value, acts as a safety valve to prevent breakdown of the insulation.

The contact maker is shown in the illustration (Fig. 2), and is easily accessible and detachable. The contact points have been given special attention, and they will be found very substantial and ensuring long life. Fig. 2 also gives a good view of the rotating and stationary portions of the distributor. Fig. 3 shows an exploded view of the B.T-H. motor cycle magneto, from which the construction of the parts can easily be seen. The high-tension slip ring is on the left side of the armature and the condenser on the right. The end cover on the extreme right of the illustration shows the arrangement of the high-tension terminal, which is absolutely waterproof, as it contains a metal socket, but no hole through into the interior, and the spark gap.

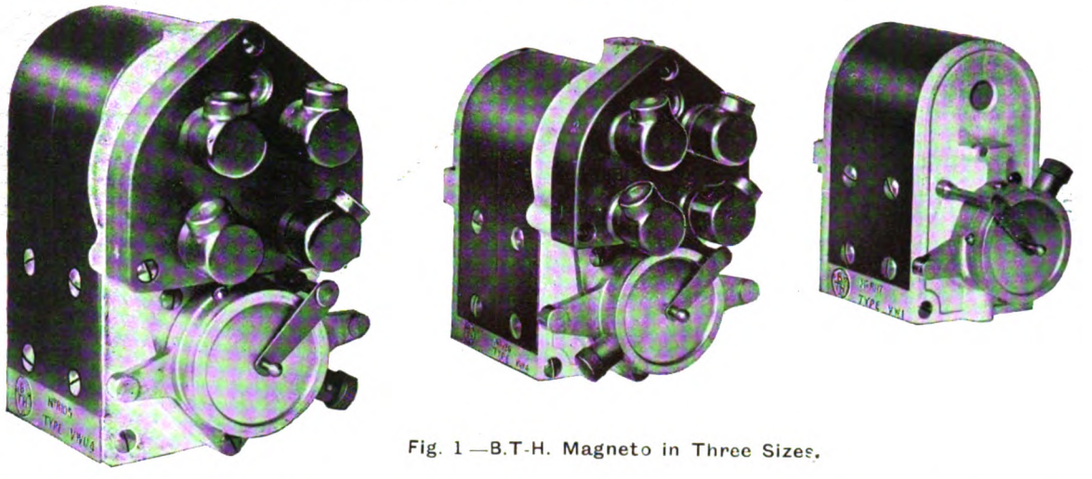

Fig. 1.—B.T-H. Magneto in Three Sizes.

B.T-H. magnetos are at present available in three sizes, a small size suitable for single-cylinder motor cycles, and two larger sizes intended for use on four-cylinder cars; other sizes are in course of development.

In view of the cessation of imports of Continental magnetos we feel that by publishing this description and acquainting manufacturers and owners of motor cars with the fact that a British-made magneto will shortly be placed upon the market will tend to inspire confidence in the quality of the magneto, and with the reputation of the B.T-H. behind it this confidence will not be misplaced.

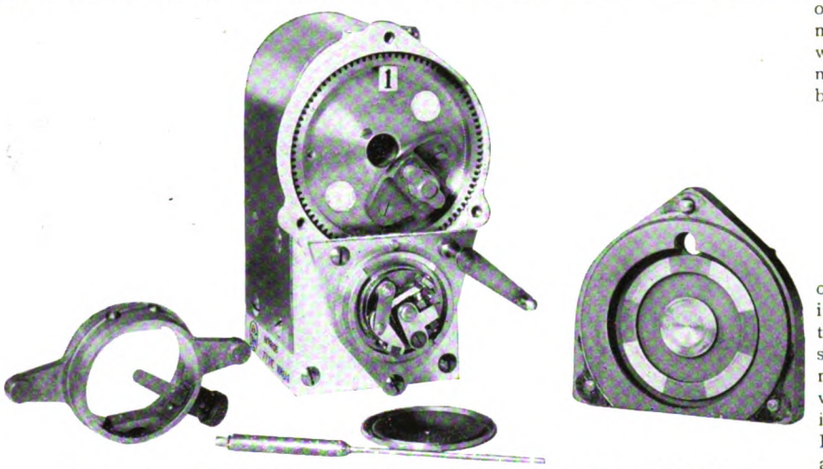

Fig. 2.—Type VWU 4 B.T-H. Magneto, with Distributor and Contact Breaker Covers Removed.

INSTITUTION OF AUTOMOBILE ENGINEERS.

At a recent meeting of the Council of the Institution of Automobile Engineers it was decided that the best interests of the industry generally would be served by the Institution proceeding with its normal work of the session. It will, therefore, hold the usual monthly meetings. As far as possible the papers to be read will deal with special difficulties which have been imposed upon the automobile engineer by the war. Papers have already been promised on these lines, and the Council also desire that the discussions shall be of the greatest possible value to the industry generally. In view of the special circumstances they extend a general invitation to all the meetings to those who are interested in the manufacture of automobiles or components, whether members of the Institution or not. Full particulars will be sent on application to the secretary.

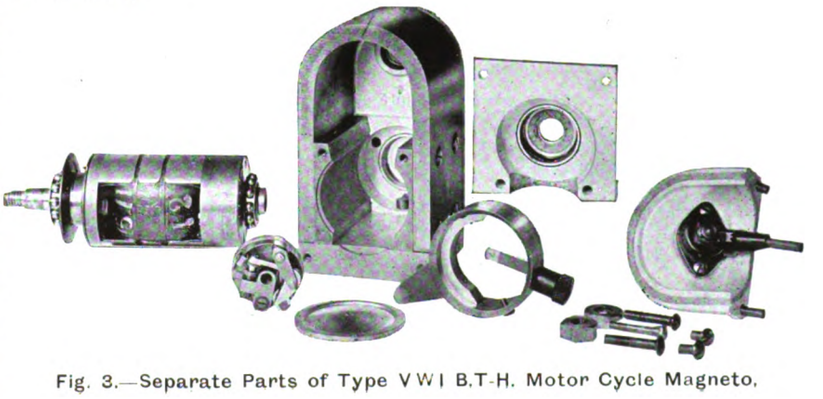

Fig. 3.—Separate Parts of Type VWI B.T-H. Motor Cycle Magneto.

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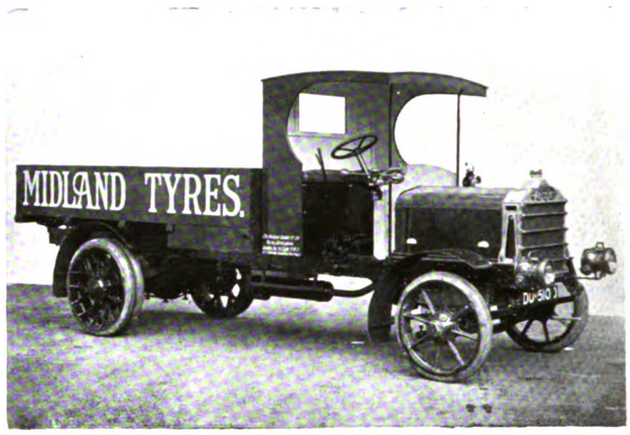
MOTOR TRAFFIC.

SOME DAIMLER TYPES.

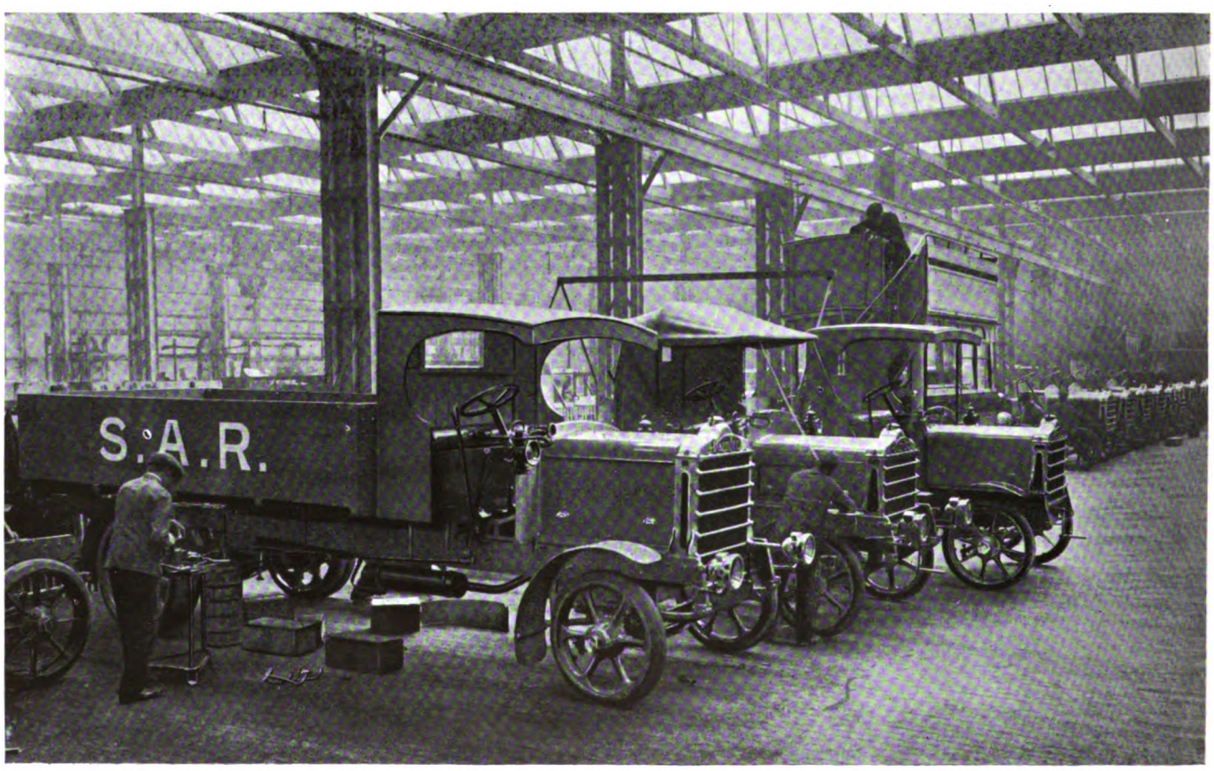
The illustrations which appear on this page give some idea of the variety of services in which Daimler machines are engaged (quite apart from the passenger-carrying services), which can truly be said to extend to all quarters of the globe. The types shown are the 5-ton high-sided lorry, 3-ton lorry, and 2-ton box van, the 5-ton and 3-ton models being exactly similar to those which the works at Coventry are still turning out in large numbers in order, as far as possible, to meet the requirements of the War Office. Each of these models embraces the standard Daimler features which have earned such an enviable reputation both in passenger and goods work. The arrangement of the mechanism is in accordance with usual practice, but accessibility to vital parts has been so carefully thought out in the design of the chassis that all the mechanism can be removed with a minimum of trouble and without the use of a lifting jack, while the vehicle is left standing upon its own wheels. The worm wheel and differential, which are of large proportions, are fitted inside a cast-steel casing, and as the gears are supported from the top cover, the whole can be removed, leaving the casing and hollow axle to support the vehicle. The Daimler silent sleeve-valve engine is fitted in each case, as also the chain-type change speed gear box.

The larger illustration is from a photograph taken in the works at Coventry, and represents part of the order for 5-ton machines received from the South African Railways. The 3-ton lorry was built to the order of the Midland Tyre and Rubber Company of Birmingham and London, and was in regular service between the company's works at Birmingham and the London depot. After a few weeks' service for that company, however, it was commandeered by the War Office. The handsome box van, mounted upon a 2-ton chassis, is fully employed in the London deliveries of Nestle's milk.

Daimler 2-Ton Van.



Daimler 3-Ton Lorry.



Daimler 5-Ton Lorries for South Africa.

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MOTOR TRAFFIC.

COMMER CARS WAR MODEL.

The works of Commercial Cars at Luton have been kept fully employed since the outbreak of the war in their endeavour to keep pace with the demands of the War Department. Some idea of the resources of the works will be gathered from the fact that they have been delivering motor lorries to the War Office at the rate of 14 per week, and to complete the orders now in hand from the Government a considerable portion of the ouput of the works will be taken for some months.

In common with a number of manufacturers, Messrs. Commer Cars were not altogether in favour with the War Office subsidy scheme, as they had reason to believe that their own experience was of more value in determining the details in the design of a chassis suitable for War Office requirements than that of the members of the Mechanical Transport Committee. However, they decided to build a new model which conformed to the conditions of the subsidy scheme, and we understand that throughout the trials complete satisfaction was given to all concerned. Our illustration of the subsidy model is from a photograph taken during the War Office trials.

Commer Car War Office Subsidy Type.

"HALLEY'S" AND THE WAR.

In common with the other leading manufacturers of heavy-type motor vehicles, Halley's Industrial Motors, Limited, have felt the influence of the war to a considerable extent. Vehicles ready for delivery to customers were commandeered, large orders were placed by the War Department for immediate delivery, and large replacement orders, from customers whose vehicles had been taken, came in from all quarters. Fortunately the recent extensions at the works at Yoker has very largely increased their capacity, so that by running complete shifts, night and day, Halley's hope to maintain a regular weekly delivery to the War Department, and at the same time give reasonable delivery to private users.

Although the loss of highly-trained workmen at the present time must be a matter of considerable importance to the firm, Mr. Halley is evidently of the opinion that the Empire's need is out of all proportion to that of private enterprise. Immediately, therefore, it became known that a further 100,000 men were required to form Lord Kitchener's second army, the following notice was posted in the works:

"Young Men,—Your country needs you. We are fighting a great and powerful nation, first and foremost, for our national honour, and secondly to ensure the future freedom and prosperity of our country, which would assuredly be lost were Germany allowed finally to triumph.

"I feel it is the duty of all able-bodied single young men, who have no serious responsibilities towards dependents, to enlist in Lord Kitchener's Army, and, as time is of the utmost importance, to enlist right away; and to such of this firm's staff and workmen who enlist and are accepted by Monday, 7th inst., I shall have pleasure in giving a grant of £5.

"(Signed) GEO. H. HALLEY, managing director."

It will readily be understood that at the commencement of the war a considerable number of the men who were either Reservists or Territorials were called to the colours, so that together with those who have responded to the foregoing appeal Halley's have now a long list of their employees serving their King and country. In order that the dependents of the absent ones shall not suffer for their public-spirited action, all those on the permanent staff will receive half-pay during their service with the colours, and in the case of married men the firm is paying the difference between the army pay and what they would have received in salary had they remained at home. As a further indication of the desire to do all that is possible during the trying period covered by the disastrous war, Messrs. Halley's, in the name of the firm, in the name of its founder and managing director, and every member of the staff, have agreed to pay a weekly sum as a donation to the National Relief Fund for the benefit of the dependents of those who are upholding the honour of our Empire, and as a further contribution the amount so collected from the employees is supplemented by the firm to the extent of sixpence for each shilling.

MOTOR OMNIBUSES AT OLDHAM.

A motor omnibus service was inaugurated in May, 1913, between Oldham Town Hall and the Coppice, while a service of cars has since been run between Moorside tramway terminus and Grains Bar. The Corporation has now three motor omnibuses in stock, and the total capital expenditure on the vehicles amounted to £2,640. The total revenue to March 25, 1914, was £1,325 and the working expenses, £1,617, while the interest on capital was £14, leaving a deficiency of £306. During the year the mileage run was 29,010, and 304,563 passengers were carried. The average revenue per vehicle-mile was 10·958d., and the expenses 13·374d. Cars on various routes in Oldham have been frequently delayed, and the service has consequently been disorganised, owing to the breakdown of motor vehicles on the track. Mr. Dugdale, the manager, in his annual report has suggested that the subject should receive the attention of the authorities with a view to minimising the inconvenience thus caused to tramway passengers. As a set-off to this it may be mentioned that a Foden steam wagon, purchased some time ago by the Corporation, has proved very efficient in the conveyance of large consignments of permanent way material from Manchester and the surrounding districts. It has also been the means of considerable saving in expense, as it has rendered unnecessary the hire of team labour.

MOTOR TRAFFIC NOTES.

ROTHERHAM CORPORATION are about to purchase a motor wagon at an estimated cost of £700.

OLDHAM CORPORATION have decided to purchase a two-seater motor car for the use of their engineer.

PORTSMOUTH CORPORATION are seeking Parliamentary powers to run motor omnibuses in the borough.

WILLESDEN URBAN DISTRICT COUNCIL are purchasing a petrol motor wagon at an estimated cost of £760.

WALTHAMSTOW URBAN DISTRICT COUNCIL have decided to purchase a motor sweeper at an estimated cost of £628.

THE DEWSBURY CORPORATION have decided to purchase a second motor fire engine, at an estimated cost of £590.

ADELAIDE MUNICIPAL TRAMWAY TRUST has decided to order 10 motor omnibuses to supplement the tramway services.—*British Australasian*.

CARDIFF TRAMWAYS COMMITTEE have decided to run motor omnibuses in Risca urban district, and are applying for licences for the same.

LEYLAND MOTORS, LIMITED, have received an order from the Dunfermline Corporation for the supply of one of their latest type fire engines.

THE BELFAST CORPORATION TRAMWAYS have accepted the tender of Messrs. Edison Accumulators, Limited, for the supply of an electric tower wagon.

THE URBAN DISTRICT COUNCIL OF WEST BRIDGFORD have received sanction from the Local Government Board to borrow £2,170 for the purchase of motor vehicles.

THE BRIGHTON, HOVE, AND PRESTON UNITED OMNIBUS COMPANY have obtained a renewal of their licences for 26 double-deck and 15 single-deck motor omnibuses.

PRESTON TOWN COUNCIL have decided to purchase two motor fire engines, and have obtained the sanction of the Local Government Board to borrow £2,400 for this purpose.

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MOTOR TRAFFIC.

THE METROPOLITAN ASYLUMS BOARD, owing to the numerous calls now being made on the motor ambulance service, have decided to increase their fleet by 10 additional machines.

MAUDSLAY MOTOR COMPANY, LIMITED, inform us that their Manchester agents, Messrs. Leach and Seed, have established a new office at Imperial Buildings, Exchange Street, Liverpool.

THE BIRSTALL URBAN DISTRICT COUNCIL have granted licences to the Yorkshire Electric Tramways, Limited, for the running of motor omnibuses through the Brighouse to Morley district.

THE MANCHESTER WATCH COMMITTEE have received the sanction of the Local Government Board for borrowing £3,760 for the purchase of motor fire engines, the repayment to extend over 10 years.

THE DUNLOP RUBBER COMPANY, LIMITED, have received an order from the Corporation of Walsall for the supply of six sets of solid band tires for the omnibuses purchased from the Daimler Company.

THE DAIMLER COMPANY, LIMITED, Coventry, have received an order from Manchester Tramways Committee for six motor omnibus chassis to replace those which have been commandeered for army service.

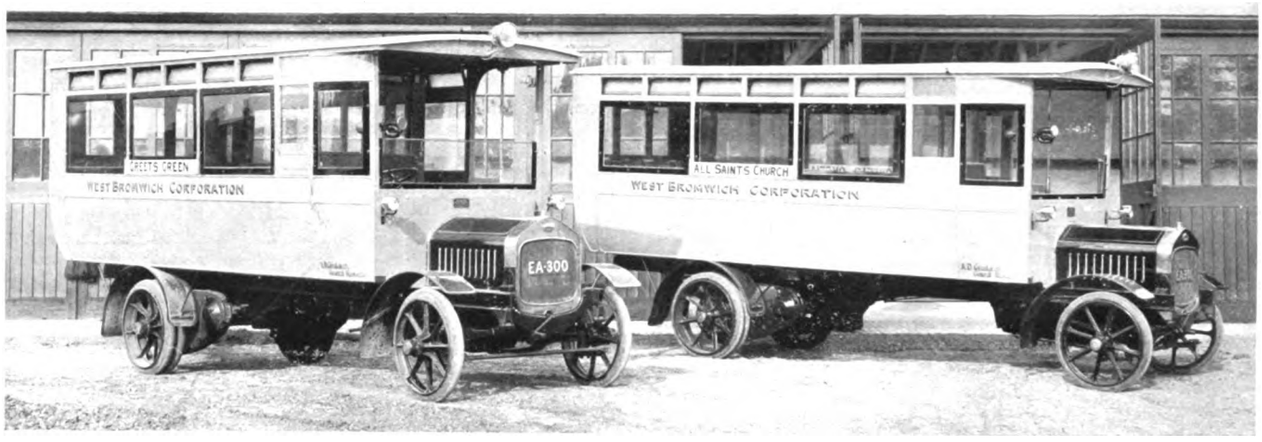
THE YORK CITY COUNCIL have instructed the manager of the tramways department to prepare specifications and to obtain quotations for two electric omnibuses for service in connection with the tramway system.

THE CORPORATION OF COVENTRY have had their fleet of Maudslay omnibuses commandeered by the War Office, these have all been fitted with wagon bodies for transport service. The Gravesend and Northfleet Tramways Company's Daimler omnibuses have also been taken over by the War Office.

TOTTENHAM URBAN DISTRICT COUNCIL are asking for tenders for a motor chassis suitable for mounting thereon their horse-drawn chemical fire engine and tender, and alternately for a complete motor fire engine and tender. Full particulars can be obtained from the superintendent of the Fire Brigade, The Green, Tottenham.

LONDON-MADE POLACK TIRES.—The new works at Isleworth, where Polack tires will now be manufactured, is a good example of an up-to-date rubber factory. The buildings have been specially designed for the economical manufacture of mechanical rubber goods, as well as solid tires, and are fitted with the latest types of rolling mills and machinery, all of which are of British manufacture.

COMMERCIAL CARS, LIMITED, OF LUTON (several hundreds of whose cars are being used by the War Department), has sent one hundred guineas to the Prince of Wales's Fund. The board has decided to pay to the wives or other persons dependent upon the men who have joined the colours a weekly amount equal to their weekly earnings less the amount the men receive as pay from the Government.



Albion 25-h p. Motor Omnibuses for West Bromwich Corporation, to Seat 24 Passengers.

PONTYPRIDD URBAN DISTRICT COUNCIL are about to erect a new fire station, and to purchase motor fire engines. Application has been made to the Local Government Board for powers to borrow the money for this purpose.

KEIGHLEY RAILLESS OMNIBUSES.—The Town Council propose to purchase two more trolley vehicles from the Cedes Electric Traction, Limited, at a total cost of £1,613. A shed for railless omnibuses is to be constructed at Utley.

SHEFFIELD CORPORATION have placed an order for six motor omnibuses with the Daimler Company, six with J. and E. Hall, of Dartford, and two motor ambulances with Straker and Squire, of Nelson Square, Blackfriars, London, S.E.

NUNEATON TOWN COUNCIL have decided to seek powers for the running of motor omnibuses. A report by the borough surveyor strongly recommends the use of electric vehicles, so that the power can be taken from their generating station.

WALSALL TRAMWAYS COMMITTEE have accepted the tender of the Daimler Company, Limited, for four double-deck and two single-deck motor omnibuses, at a total cost of £4,595. Six sets of tires are to be purchased direct from the Dunlop Company at £321 7s.

OLDHAM CORPORATION TRAMWAYS have recently experimented by running motor omnibuses in the Denshaw district. The experiment has proved highly successful, and at a recent meeting of the Tramways Committee it was decided to give motor omnibuses a further trial.

Mr. O. LEEMAN, who has been for a number of years with the Shrewsbury and Challiner Tyre Company, Limited, has taken up a position with Messrs. Wallington, Weston and Company, Limited, the well-known manufacturers of the Frome tire, with temporary London offices at Bank Buildings, Kingsway.

THE CORPORATION OF LIVERPOOL have decided to purchase 24 additional motor chassis at an estimated cost of £700 each for the Health Department. The necessity for these vehicles has been brought about in consequence of the commandeering of a large number of the Corporation's horses by the War Department. We understand that the type of chassis decided upon is the Halley six-tonner fitted with a 45-H.P. engine.

MOTOR OMNIBUS RESULTS AT SHEFFIELD.—The Corporation are now working 13 motor omnibuses, and have ordered six others. The first complete year of the service terminated on March 25 last, and the results appear to be encouraging. The total revenue was 10·20d., and the expenses 8·779d., including depreciation (on a five year basis) of 1·520d. per mile run. The balance of 1·421d. per mile (£1,794) has been carried to a special reserve fund. Petrol cost 1·841d. per mile.

THE AVON INDIA RUBBER COMPANY, LIMITED, inform us that they have not withdrawn the 10,000 miles' guarantee hitherto attached to the purchase of their solid band tires. The guarantee holds good provided the undermentioned sizes are fitted to vehicles constructed to carry the following loads:

15-20 cwt.	85 mm.	40-60 cwt.	120 mm.
20-25 cwt.	90 mm.	60-80 cwt.	140 mm.
30-40 cwt.	100 mm.	80-120 cwt.	160 mm.

MOTOR MAIL SERVICE.—The surveyor for the North Eastern District of the General Post Office at Leeds is asking for tenders for the contract for a proposed motor mail service between (*a*) Sunderland and Newcastle-on-Tyne, (*b*) Sunderland and Haswell, and an alternative tender for the *b* service with an extension to Merton on Sundays. Full particulars may be obtained on application to the surveyor's department, and the tenders must be posted not later than the 17th inst.

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THE

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Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

CITY OF BRADFORD.

TRAMWAYS DEPARTMENT.

TENDERS FOR GENERAL STORES.

The Bradford Corporation are prepared to receive tenders for the supply of Miscellaneous Stores required by the Tramways Department during the year ending December 31, 1915 (six or twelve months), as follows, viz.:—

Schedule No.

1. Bolts, Nuts, Screws, Washers, Nails, Cotter Pins, Rivets, Brass Rod, Lead, Hack Saw Blades, Twist Drills, and Miscellaneous Ironmongery.
2. Files.
3. Lamp Fittings.
4. Insulating Material, Tapes, Calico, and Canvas Hose.
5. Sand-Bags.
6. Copper Fuse Wire.
7. Iron, Malleable and Steel Castings.
8. Phosphor Bronze, Gun Metal and Brass Castings, Copper Controller Finger Contacts, and Drivers' Alarm Bells.
9. Insulated Bolts and Strains.
10. Bar Iron and Steel, Galvanised Steel Sheets, and Lead-Coated Steel Sheets.
11. Oils and Greases.
12. Paints, Dry Colours, and Shellac.
13. Spirits and Acids.
14. Drysaltery and Disinfecting Fluid.
15. Paint Brushes and Cleaning Brushes.
16. Waste, Sponges, Wash-Leathers, Cleaning Cloths, and Soap.
17. Transfers and Gold Leaf.
18. Glass.
19. Steel Pinions.
20. Delivery Hose, Indiarubber, Vulcanite Fibre, and Insulating Paper.
21. Timber.

Schedule and conditions of tender may be had on application at the Tramway Offices, 7, Hall Ings, Bradford, on payment of the sum of one guinea, which amount will be refunded on receipt of a *bona-fide* tender. (Cheques to be made payable to the order of the Bradford Corporation.)

The contracts will be let subject to the Fair Contracts Clauses of the Corporation.

Samples can be inspected at the aforesaid Tramway Offices.

Tenders, endorsed "Tender for Stores," to be sent to me not later than Saturday, the 17th inst. The lowest or any tender will not necessarily be accepted.

FREDERICK STEVENS,
Town Clerk.

Town Hall, Bradford,
October 1, 1914.

CITY OF BIRMINGHAM.

TRAMWAYS DEPARTMENT.

TENDERS FOR UNIFORM CLOTHING AND CAPS.

The Tramways Committee are prepared to receive tenders for the supply of Uniform Clothing and Caps for the Inspectors, Motormen, and Conductors.

Forms of tender may be had on application to the undersigned at the Tramway Offices, the Council House, Congreve Street, Birmingham. Tenders must be made on the form provided, and must be handed in not later than 12 o'clock noon on Monday, the 2nd day of November, 1914.

The Committee do not bind themselves to accept the lowest any tender.

Persons tendering must at the time of tendering and at all times during the execution of the works be paying all their workpeople not less than the standard rate of wages in the districts where such workpeople are actually engaged in the execution of the work, and must be observing the hours and conditions of labour recognised by the Associations of Employers and the local organised bodies of workers in the various trades in such districts. The contractor will be held responsible for the observance of these conditions by any sub-contractor employed by him.

The contractor must also agree to comply with and conform to the provisions of the Trade Boards Act, 1909.

ALFRED BAKER,
General Manager.

The Council House,
Congreve Street, Birmingham.

COUNTY BOROUGH OF BLACKPOOL.

ELECTRICITY SUPPLY DEPARTMENT.

The Electricity Committee of the Blackpool Corporation are prepared to receive tenders for the following, required during the next six months:—

(1) 24 C.I. Distribution Pillars.
(2) H.T. and L.T. Cables.
(3) Earthenware Conduit.

Particulars can be obtained from the undersigned on application.

The Corporation do not bind themselves to accept the lowest or any tender.

CHARLES FURNESS,
Borough Electrical Engineer
and Tramways General Manager.

Electricity Works, West Caroline Street, Blackpool,
October 6, 1914.

THE GREAT INDIAN PENINSULA RAILWAY COMPANY.

The Directors are prepared to receive tenders for the supply of the following Stores, namely:—

Points and Crossings.	Spark Arresters, Wire Gauze, etc.
Steel Screw Couplings, etc.	Dressed Wagon Covers.
Axles.	Galvanised Wrought Iron Water Tubes, etc.
Galvanised Buckets, Mortar Pans, etc.	
Leather Belting, etc.	

Specifications and forms of tender may be obtained at this office on payment of the fee for the specification, which payment will not be returned.

Tenders must be delivered in separate envelopes, sealed and addressed to the undersigned, marked "Tender for Points and Crossings," or as the case may be, not later than 11 o'clock a.m. on Thursday, October 15, 1914.

The Directors do not bind themselves to accept the lowest or any tender.

R. H. WALPOLE,
Secretary.

Company's Offices,
48, Copthall Avenue, London, E.C.,
October 6, 1914.

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LEICESTER CORPORATION.

TRAMWAYS DEPARTMENT.

TICKETS.

The Committee invite tenders for the supply of Passenger Tickets, with advertising rights, for 12 months, commencing January 1, 1915.

Specifications and conditions and forms of tender may be obtained on application at the Tramway Offices, Humberstone Gate, Leicester.

Sealed tenders, endorsed "Tender for Tickets," addressed to "The Chairman, Tramways Committee, Humberstone Gate, Leicester," must be delivered not later than Saturday, October 24, 1914.

The Committee do not bind themselves to accept the lowest or any tender.

A. F. Lucas,
Manager.

October 8, 1914.

PONTYPRIDD URBAN DISTRICT COUNCIL.

ELECTRIC LIGHT AND TRAMWAYS DEPARTMENT.

The above Council invite tenders for the supply, delivery, and jointing of about 1,800 yards of .4 Concentric Paper Insulated and Lead Covered Cable.

General conditions and form of tender may be obtained upon application to Mr. J. E. Teasdel, A.M.I.E.E., Electricity Works, Treforest, on payment of a deposit of one guinea, which will, after the Council shall have entered into a contract upon the tenders received, be returned to the tenderer, provided he shall have sent in a *bona-fide* tender and shall not have withdrawn the same.

Tenders, on the prescribed form, sealed and endorsed "Tenders for Cable," must be received by the undersigned on or before Monday, October 19, 1914.

The Council do not bind themselves to accept the lowest or any tender.

J. Colenso Jones,
Clerk to the Council.

Municipal Buildings, Pontypridd,
October 3, 1914.

READING CASES
To hold 26 Saturday Issues of
"THE TRAMWAY AND RAILWAY WORLD."
May be obtained from the Publishers,
Price **2s. 6d.** postage included.

SEND YOUR ENQUIRIES FOR
Insulating Materials,
Brass, Iron, and Copper Stampings, and General Supplies
TO
JOSEPH THOMPSON,
COLUMBIA WORKS, 106, Eyre Street, SHEFFIELD.
Telegrams: "Insulator. Sheffield."
Engineers' Specifications worked to.

TRAMWAY SUPPLIES, Ltd.,
Tramway Engineers,
Sole Selling Agents for S. Dixon & Sons' Tramway Material,
160, WOODHOUSE LANE, LEEDS.
Sole Manufacturers of
TURNER'S PATENT AUTOMATIC POINT CONTROLLERS.
Telegrams: "Controllers, Leeds." Telephone: 3488 Leeds.
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which keep their colour and prevent rust. Kearsley's ready-mixed Pole Paints are used by important Tramway Companies the world over, and give entirely satisfactory results under extreme climatic conditions.
Robert KEARSLEY & Co., Ltd.
RIPON, England.

MILLARS' TIMBER AND TRADING CO., LTD.
PINNERS' HALL, GREAT WINCHESTER STREET, LONDON, E.C.
SUPPLY
JARRAH
THE SANITARY WOOD PAVING
REGISTERED TRADE MARK M.J.
Telegrams: "Jarrah. London."
Telephone: 368. London Wall.

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for finishes of great durability and brilliant lasting lustre.
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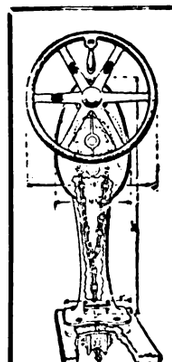

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Patented in all Countries. British Patents issued in 1908, 1909.
Quick Operation. Powerful Application. Easy Installation.
Correspondents: ACKLEY BRAKE CO., 50, CHURCH STREET, NEW YORK.
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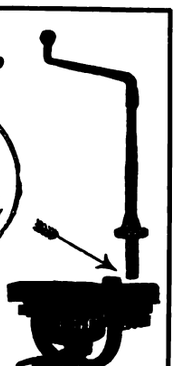

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THE
Tramway AND Railway World

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SATURDAY, OCTOBER 10, 1914.

THE "OCEAN"
ACCIDENT AND GUARANTEE CORPORATION, LTD.
IS THE
PREMIER INSURER OF TRAMWAYS
HEAD OFFICE:
MOORGATE STREET, LONDON, E.C.

THE MISSING OF PASSENGERS.

In these days, when, owing to circumstances arising out of the War, tramway receipts in many of our towns show a falling off, it behoves managers to do everything possible to maintain the revenue and reduce the expenditure. Many expedients for the purpose are no doubt difficult to carry out, but there is one which an outsider would think is easy and ought to be easy, but in an exasperating way often proves difficult. This expedient merely consists in getting the conductors on the cars to keep a sharp look-out for passengers and to lose no opportunity of trying to get even what may be called tentative passengers on board. The uninitiated member of the public may suppose that all that is required is for the manager to issue a general instruction to the conductors and the thing will be done. Yet nothing can be more certain than that such instructions are issued and that in multitudes of cases would-be passengers are ignored and left behind. When the conductor is not collecting fares, he frequently occupies himself with gazing into the interior of the car instead of keeping his eye on the near side of the road for possible passengers at optional stopping places. The drivers also, though we think to a less extent, are to blame for failing to stop when signalled to by would-be passengers. In the case of London there is also the ubiquitous omnibus to be considered. As these vehicles are supposed to pull up anywhere when required and not merely at fixed stopping places, their drivers have a fine opportunity for picking up passengers in a promiscuous way. But too often they do not keep a sufficient watch, and the omnibus rolls along leaving the wrathful pedestrian who wished to board it gesticulating in vain. This sort of thing has an evil result which is two-fold. The public are made angry and resentful, and they are discouraged from waiting for a car or an omnibus when their journeys are to be short. On the other hand, the authority owning the vehicles is deprived of legitimate revenue, while the working expenses go on just the same. It is quite evident that a remedy is not easily to be found. If the remedy were at all obvious it would have been found long ago. In regard to many kinds of breach of discipline or disregard of instructions, the older method of fines or the newer method of demerit marks is easy of application. But in this case proof of the offence is not easy. A local authority can hardly keep an inspector at every stopping place to watch whether the drivers and conductors are properly on the look-out for possible passengers. Still less can an omnibus company keep men posted everywhere along busy routes to see that the omnibuses stop wherever the driver or conductor is hailed. Some drivers and conductors are of course first-class collectors of passengers; others seem to be deaf to instructions and orders. Something may be done by putting a limited number of observers on to certain routes, and shifting them about to other routes from day to day, meanwhile keeping secret what routes they are on. As before remarked, the matter is of special urgency at the present time, and from complaints which have reached us it appears that the need for increasing the revenue has not made some drivers and conductors in the least more attentive to this important part of their duties than they used to be. Perhaps an effort on the part of their superior officers to stir up the faculty of imagination would be an aid to instructions and inspection. A vivid picture of the wrath of the choleric old gentleman or the strong-minded lady left stranded instead of being taken aboard might have beneficial results.

TRAMWAYS AND THE WAR.

MANCHESTER.—The Tramways Committee report that 370 Territorials and Reservists have been mobilised from the department, whilst 330 employees have volunteered for active service. There are now 506 families in receipt of half-pay allowances from the tramways department.

DEVONPORT.—The Tramways Committee reported at a meeting of the Town Council on Monday that the town clerk of Plymouth had, in accordance with the request of the general officer commanding, given instructions for the permanent way and electrical equipment of the Plymouth Corporation tramways to be connected with the Devonport and District tramways for military purposes.

BRADFORD.—At a meeting of the Tramways Committee on Monday, Mr. C. J. Spencer, the manager, reported that 132 men from the department had gone to serve with the fighting forces. Up to October 3 he had been notified of nine casualties among them. Up to September 29 the Corporation have paid to the families of reservists from the tramways department £357. The employees of the department have contributed to the Lord Mayor's Relief Fund by means of voluntary deductions from salaries the sum of £210.

READING.—At the last meeting of Reading Town Council, Mr. G. F. Craven, general manager of the tramways, reported in regard to an order by the Council for four motor omnibuses. The war broke out before the order was placed with the Daimler Company, and the War Office at once commandeered all the motor omnibus chassis of that company. At the same time the price of material had so increased that the Daimler Company were obliged to raise their quotation by 10 per cent. The omnibuses were therefore not ordered, and at present, owing to the large orders from the War Office, the Daimler Company were not in a position to accept the Reading order, even at the higher price.

ABERDEEN.—At a meeting of Aberdeen United Trades Council on September 30 a discussion took place on a letter which appeared in a local newspaper proposing that certain classes of male workers, such as tramcar conductors, should be replaced by women, so that the men might be constrained to serve with the colours. Several speakers pointed out that this amounted almost to compulsion. The Chairman (Mr. D. Palmer) remarked that those well-intended ladies who started knitting socks, by their action were adding to the volume of unemployment in these times. There was quite a number of hands in factories idle. The Trades Council ought to protest against the publication of the letter and the proposal that women should take the place of men. It was just conscription. A resolution was passed protesting against the proposal contained in the letter.

BLACKPOOL.—Tramways in seaside resorts have, of course, been especially affected by the war owing to the number of holiday makers being so much smaller than usual. Perhaps the most remarkable case is that of Blackpool, where between August 14 and September 17 the receipts were £8,544 less than they were during the corresponding period of last year, their total stand-

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ing at £12,086. In the early part of the season before the war broke out the receipts had been increasing. The number of passengers between the same dates was 1,765,812, compared with 2,778,682 for the same period last year. The car mileage was reduced by 37,341, but in spite of this the receipts per car mile went down from 2s. 6½d. to 1s. 11½d. Even the reduced figure might be considered very large were it not for the fact that it is Blackpool with which we are dealing.

Liverpool.—The Tramways Committee have issued nearly 400,000 passes enabling men who belong to His Majesty's forces to travel free on the cars. The passes are given to the West Lancashire Territorial Association, by whom they are distributed to the commanding officers, who in turn have instructions to give them to every man who enlists. Even those recruits who are not equipped with uniform can, on production of their regimental papers or a voucher from the recruiting officer, secure the same privilege. In regard to the Liverpool Tramway employees, about 27 per cent. of them have joined the colours, and those remaining in the service have arranged to contribute to the local branch of the Prince of Wales's Fund. The rank and file are giving weekly 1d. out of every 5s. of their wages, the clerical staff 2½ per cent. of their salaries, while the higher grades are contributing a still larger proportion. The total will amount to some £60 a week, or about £3,000 a year.

London Underground Railways.—The privilege of riding free on the London underground railways and the tramways and omnibuses associated with them, which was granted to soldiers in uniform, has now been withdrawn. Soldiers, sailors, red cross nurses and boy scouts will, however, still be able to travel free on the railways if they have the necessary Government warrants or vouchers. In regard to the dependents, numbering about 12,000, of the 4,000 men who have left the employment of the associated companies to serve with the forces a Mutual Aid Fund has been formed under which every 1d. contributed by the employees is doubled by an equal subscription from the companies. The ordinary War Office allowance and allotment of soldiers' pay while on active service is increased by the fund to make up the total income of the home to the following amounts:—Wife only, 17s. 6d.; wife and one child, 20s.; wife and two children, 22s.; wife and three children, 24s.; wife and four children, 26s.; wife and five children, 26s. 9d.; wife and six children, 28s.; wife and seven children, 29s.; wife and eight children, 30s. Other dependents will receive amounts according to circumstances. This scale does not apply to families of men who have gone out in the Motor Transport Corps, as they are fortunately receiving a high rate of pay, and their dependents are in as good a position as when they were working in London. But if any of the dependents of the motor transport men are in any perplexity or distress they are urged to communicate with the committee.

Edinburgh.—The Edinburgh and District Tramways Company are carrying out a scheme for obtaining contributions from the public for the Prince of Wales' Relief Fund. Posters are displayed informing the public that beginning on September 28 the conductors of all cars would be supplied with what are described as war tickets for the purpose of assisting the fund. Another poster stated that the proceeds from the sale of these tickets on a certain day would be devoted to the Belgian Distress Fund. Simultaneously a notice was issued to the car conductors expressing the hope that they would push the sale of the War Fund tickets with all their might. Arrangements were made to give prizes during the first week to the three conductors who sold the most tickets. The war ticket itself is a small piece of thin pasteboard after the style of a tramway ticket. On one side it has the name of the company and the words "Prince of Wales' National Relief Fund, 1d.," while there is also a serial number. On the other side the purchaser is informed that if every person boarding an Edinburgh car were to purchase one of these tickets a sum exceeding £4,000 per week would be realised for this most deserving Fund. The sale of the war tickets during the first week realised £607. A recruiting car decorated with flags is being run in Edinburgh. A piper travels on the top and a recruiting sergeant on the footboard Men who wish to join the Army are asked to jump on.

ROAD CONSTRUCTION TO RELIEVE DISTRESS.

A useful summary of the principal steps taken by the Government for the relief of distress has been issued by the Local Government Board. From this it appears that the Government have urged upon local authorities the importance of mitigating the results of any dislocation of industry, which may have occurred in the district of the local authority, by reason of the war, by expediting any scheme of work within the powers of the local authority. The information in the possession of the Local Government Board indicates that the local authorities have responded with readiness to the suggestions made by the Government.

It has been ascertained that during the period between August 4 last and the 21st ult. over 600 applications have been made by local authorities in England and Wales, not being Poor Law authorities, for the sanction of the Local Government Board to the borrowing of money with which to defray the cost of schemes adopted by the local authority. The total amount of the loans desired exceeded £2,500,000. During the same period the Board have sanctioned loans desired by local authorities in England and Wales, other than Poor Law authorities, to the extent of over £3,500,000, as compared with about £1,928,000 sanctioned during the corresponding period of last year.

The Road Board are also rendering valuable assistance to the local authorities of areas in which exceptional distress from want of employment exists. Three large schemes for the construction of new roads, including the new Western Approach Road to London, had been arranged with the local authorities before the outbreak of war. These schemes will be put in hand at an early date. In addition the Road Board have arranged to make grants to an aggregate amount of nearly £450,000 towards works of new road construction and road improvement in many parts of the country, which will involve a total expenditure of about £1,000,000. These grants will be spread over 81 local authorities, and preparations have been made for proceeding with work in each case immediately any exceptional distress from want of employment arises in any of those areas. In regard to 36 areas the Road Board have already arranged, in consultation with the Local Government Board, that road improvement works estimated to cost £203,000, towards which the Road Board are making grants of £85,000, are to be begun at once.

The Development Commissioners have also under consideration some schemes relating to the construction of light railways, the improvement of the navigation of rivers and other works, in order that work of this character may be ready in case a need for providing further employment should arise.

BRITISH ELECTRICAL MUTUAL AID FUND.

Mr. C. G. Tegetmeier, as chairman of the Central Committee of the British Electrical Federation Mutual Aid Fund, has issued under date of October 3, a memorandum to contributors showing the operation of the fund to September 23. The fund applies only to employees of the federated tramway and other companies paid weekly as distinguished from the salaried staff. All cases of salaried officers are dealt with direct by the companies concerned. The particulars given in the memorandum relate only to companies belonging to the Federation outside the Metropolitan area. The London companies are included in a scheme which is worked in conjunction with the underground electric railway and allied companies.

The memorandum shows as regards the fifty-one companies included in it that the number of employees at the end of July was 7,632. Out of these 578 enlisted and the number whose dependents were receiving grants from the fund was 348. The number of dependents so receiving grants was 900. The total contributions to the fund to September 23 amounted to £963, of which £567 came from the companies and £396 from the employees. The total grants paid up to September 23 were £537, and the amount being paid weekly at September 23 was £143, while the weekly contributions approximated £200. Under the constitution of the fund the companies undertook to contribute a sum equal to the amount contributed by the employees, and in any case a minimum of threepence per week in respect of every man in the companies' service. The balance in hand at September 23 was £421, and it was hoped that the resources of the fund would continue to be sufficient to enable grants to be made which, with the allowance by the State, would in most cases maintain the dependents of all employees in the same financial circumstances as they were in when the heads of the family were earning wages. The number of recruits was being added to so that the number of those receiving grants would tend to increase and the contributions from employees to decrease. It is proposed to issue a statement regarding the fund from time to time.

MISCELLANEOUS NEWS AND NOTES.

Transfer Tickets at Derby.—The Derby Tramways Committee have decided to experiment with transfer tickets on various routes.

Motor Omnibuses at Rotherham.—A motor omnibus service was inaugurated last Saturday between the Rotherham tramway terminus at Canklow and Catcliffe and Treeton.

Electrical Vehicle Progress.—Mr. H. Thompson Lee, electrical engineer of Wimbledon, has been instructed by the Council to draw up a report as to the desirability of adopting electrically propelled vehicles.

Tramway Assessments.—Deputations from East Ham and West Ham Assessment Committees will hold a conference with the object of securing a settlement of outstanding difficulties in regard to the assessment of the tramway undertaking in respect of towns.

London and South Western Railway Electrification.—The directors have decided to issue new 5 per cent. preference 10 year terminal bonds to the value of £1,000,000 to defray the cost of the electrification scheme which is now being carried out. The issue will be offered at 99¾ per cent.

The London School of Economics.—The first of the series of lectures on "The Economics of Electric Traction," which, as previously announced, will be delivered by Mr. H. M. Sayers at the London School of Economics, Clare Market, Kingsway, W.C., will be given on Wednesday, October 14, at 6.15 p.m.

London Electrical Engineers Territorials have now received permission to recruit, and the opportunity is thus offered to electrical engineers to join a corps where their technical training will prove of much value to the service. Applications should be made personally or by letter to the Commandng Officer, 46, Regency Street, Westminster, S.W.

Glasgow Harbour Tunnel.—At a meeting of a sub-committee of Glasgow Tramways Committee on Tuesday, it was resolved by 16 votes to 12 to recommend to the Corporation the purchase of the Harbour Tunnel at the price of £100,000 fixed on in the agreement of option arrived at 15 months ago.

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Birmingham Motor Omnibuses.—At a meeting of the Tramways Committee on Tuesday, it was reported that the Corporation took over the motor omnibuses in Birmingham from the Birmingham and Midland Motor Omnibus Company at midnight on Saturday last, and the Corporation were now running them.

Accrington Through Running Discontinued.—At a meeting of Accrington Town Council on Monday it was intimated that the through tramway service from Accrington to Bacup would be discontinued. The Accrington cars would turn in Rawtenstall, and this would obviate many delays at Haslingden. It was considered that the through traffic to Bacup was too small to make the continuance of through running desirable.

Extensions at Leeds.—Work is being begun on the construction of the new Leeds tramway line at Guiseley, and a start is to be made with the erection of the overhead equipment for the railless cars which will run from the White Cross, Guiseley, through Otley to Burley. It is hoped also to begin the construction of the tramway extension from York Road to Halton, and the workmen will shortly begin the erection of the new tramways offices at the junction of Swinegate and Lower Briggate. The Tramways and Electricity Committee have decided to apply for power to borrow £32,000 for the construction of the new offices.

Stirling and Electric Tramways.—According to a local newspaper there is now no hope of Stirling possessing an electric tramway system for years to come. Some time ago the Town Council refused to accept an offer by Mr. Balfour, of Messrs. Balfour, Beatty and Co., which would have led to electrification, and now the war has put out of the question any scheme for the Corporation carrying out the work itself. The remaining course open is to give the Stirling and Bridge of Allan Tramways Company security of tenure for some years, so that they may continue their experiments with petrol cars. The line is one of the few remaining in the country which is worked by horses.

A Proposed Edinburgh Extension.—A few years ago an unsuccessful proposal was made by a company for the construction of a tramway from Edinburgh to Queensferry, a distance of about eight miles. The scheme is now being revived municipally, and at a meeting of Edinburgh Tramways Committee on October 2 consideration was given to a motion by Councillor Deas to report as to the expediency of providing tramways to Queensferry, in view of the increased and rapidly growing inter-communication between Edinburgh and Queensferry, and the development of Rosyth. Two alternative routes are to be gone over by a sub-committee, one from the Dean Bridge and the other by Murrayfield and Ravelston, where a new road is projected.

An Important Huddersfield Extension.—Colonel Druitt, of the Board of Trade, inspected the extension of Huddersfield Corporation tramways from Slaithwaite to Marsden on October 1, and the line was soon afterwards opened for traffic. The distance from the centre of Huddersfield to Marsden is fully seven miles, and the fare is 5d., as compared with 7d. on the railway. The length of the new route is 2 miles 36 chains, and the single-track length is 4 miles 70 chains. The track construction, which was carried out under the supervision of Mr. K. F. Campbell, the borough engineer, occupied a little over three months. Granite sett paving and welded joints are employed. Mr. R. H. Wilkinson, the tramway manager, was responsible for the electrical equipment, and the whole work was executed under the administration of the Tramways Committee.

Power from Waste Gases.—The British Westinghouse Company have just issued a copy of a new circular under this title. The pamphlet has a striking cover in colours and is finely illustrated with photographic reproductions of the Westinghouse gas engines, and it should be in the hands of all those contemplating equipment of plant of this character. An account is given of several interesting installations, together with estimates of typical capital and running costs. An interesting portion of the circular deals with power from blast furnace gas from which interesting developments may be expected in the near future. The Westinghouse Company have also published a handsome pamphlet illustrating and describing the Westinghouse vertical tandem gas engine, excellently printed on tinted paper.

CONTRACTS AND ORDERS.

The Cedes Electric Traction Company, Ltd., are supplying a 30-cwt. electric vehicle to the Metropolitan Asylums Board.

Salford Electricity Committee has accepted the tender of Willans and Robinson, Ltd., for a 5,000 k.w. alternator at £10,410.

Walter Scott, Ltd., are to supply 250 tons of steel rails to Bolton Corporation tramways on the terms of the existing contract.

West Bromwich Town Council has ordered from the Brush Electrical Engineering Company, Ltd., a 500 k.v.a. static transformer.

Hadfields, Ltd., have been awarded the contract for the points and crossings required during 1915 by the Bolton Corporation tramways at the present contract price.

The Tudor Accumulator Company have received an order from Grimsby Town Council for the maintenance of two batteries at the electricity works for a further period of ten years.

Hull Tramways Committee have accepted a tender by the Sheffield Brightside Foundry and Engineering Company of £6,873 for the heating and ventilating of Liverpool Street workshops extension.

Edison Accumulators, Ltd., have a contract from York Corporation for the supply of four single-deck electric omnibuses at £1,172 each. They will be fitted with Edison nickel steel accumulators, and will be similar in design to the vehicles recently supplied to Southend and South Shields Corporations.

The British Insulated and Helsby Cables' tender for cables has been accepted by Warrington Town Council at £23 14s. per ton. The Albion Clay Company are supplying the earthenware conduits to the Corporation.

Bury Town Council has accepted the following tenders:—British Insulated and Helsby Cables, Ltd., copper trolley wire, line ears, and straight line hangers; E. Smith and Company, strain wire; J. Russell and Sons, Ltd., poles; F. R. Cass, small bases; Thermit, Ltd., welding rail joints; Tramway Supplies, Ltd., insulated bolts and Brooklyn strain insulators; Estler Brothers, Ltd., section insulators; W. Scott, Ltd., steel girder tramway rails; Bayliss, Jones and Bayliss, Ltd., tie bars; Leeds Steel Works, cross anchors; Edgar Allen and Co., Ltd., clips.

PERSONAL.

Liga Tyres, Ltd., is now in liquidation, and Mr. Reginald Ives, of 26, Portugal Street, Kingsway, has been appointed liquidator.

Mr. Guy Calthrop, the new general manager of the London and North Western Railway Company, has become a member of the Railway Executive Committee in place of Sir Robert Turnbull, who has resigned.

Councillor R. Tootill, who has been elected unopposed as member of Parliament for Bolton, has received a resolution of congratulation passed by the Bolton branch of the Tramway and Vehicle Workers' Association.

Mr. George Kidd has recently been appointed general manager of the British Columbia Electric Railway Company, Ltd., at Vancouver, B.C., in succession to Mr. Sperling, who has been appointed to a position on the London Board, as previously announced.

Sir Edgar Speyer has retired from the partnership of Messrs. Speyer and Co., of New York. The firm have notified the New York Stock Exchange that by virtue of the King's Proclamation of September 9, it became impossible for Sir Edgar, a partner in the firm, residing in London, and a British subject, to have any direct or indirect connection with any firm doing business with persons resident in Germany. It is understood that Sir Edgar Speyer will resume his partnership after the war. As the head of the corporation which controls the system of the London Underground Railways and omnibus systems connected with it, London is specially indebted to Sir Edgar Speyer for the excellent service of transport which it now enjoys.

The Northampton Tramway Manager.—Mr. Gottschalk, manager of Northampton Corporation tramways, has been put to a good deal of trouble owing to the fact that he was born in Germany. He has lived in England since he was a lad, but though his sympathies and connections are English he neglected to apply for naturalisation until the outbreak of the present war. Evidently he had not thought about the matter, but now naturalisation papers have been granted to him. Recently we published his manly protest to the Tramways Committee against attacks which had been made on him from outside, and noted that the committee passed a vote of confidence in him. At a subsequent meeting the committee unanimously reaffirmed their confidence in Mr. Gottschalk. Then came a meeting of ratepayers (noted in our issue of last Saturday) protesting against the retention of his services. The unfairness of this meeting may be judged from the fact that it refused to hear anything on the other side. The Northampton Trades Council, at a special meeting on October 1, passed with only two dissentients, a strongly-worded resolution protesting against the attack on a faithful servant of the borough. Mr. J. Gribble, who moved the resolution, described the attacks which had been made on Mr. Gottschalk as inhuman treatment, and said that that gentleman's conduct had been absolutely unimpeachable. Mr. Sneyd, a representative of the tramway workers, who seconded the motion, declared that Mr. Gottschalk was the most straightforward gentleman he had ever worked under. Whenever the men had gone to him as a deputation Mr. Gottschalk had received them with every courtesy and respect. The treatment being meted out to Mr. Gottschalk was unmanly and un-English, and 95 per cent. of his men would stand by him, whether he was German or Jew or any other nationality.

FINANCIAL REPORTS AND MEETINGS.

Babcox and Wilcox, Ltd.—An interim dividend of 5 per cent. on the ordinary shares is announced.

Calcutta Tramways Company.—The directors have declared an interim dividend at the rate of 6 per cent. per annum on the ordinary shares for past half-year.

Barsi Light Railway.—The directors recommend a final dividend of 3 per cent., together with a bonus of 2 per cent. (10s. per share in all), making with the interim distribution in April last a total payment of 10 per cent. for the year to March 31. A sum of £15,226 is transferred to reserve account for equalisation of dividends, etc.

Maidstone Corporation Tramways.—Mr. A. T. Lambert, general manager of Maidstone Corporation tramways, in his report for the year ended March 31 last, gives an abstract of the financial results, from which it appears that the total income was £10,966, as compared with £10,206 in the previous year. The working expenses were £7,201 against £6,705. After meeting loan charges, there was a deficit chargeable to the borough rate of £821 as compared with a deficit for the previous year of £1,403. The amount of the deficit for each year during the last four years has been rapidly decreasing. The increase in the working expenses during the past year was chiefly due to the heavy cost incurred in maintaining the permanent way. The great number of motor omnibuses

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and other self-propelled heavy vehicles have also contributed largely to the heavy wear and tear of the roads, for a great proportion of which the tramway department had had to pay. The traffic revenue per car mile was 8.06d., and the working expenses 5.65d. The number of miles run was 309,256, and the number of passengers 2,407,769. The population served is 25,000, and the length of line is 3 miles 37 chains of single track and 1 mile 63 chains of double track. The consumption of energy per car mile was 1.2 units, and the number of cars in stock was 19.

Dick, Kerr and Company, Limited.—The report of this company for the year ended June 30, 1914, shows a notable improvement on the results of the previous year, as will be seen from the summary set out below :—

	1914.	1913.	1912.
Net profits	£44,761	£30.092	£3,275
Balance from last year	10,325	10,016	36,892
	£55 036	£40,108	£40,167
Debenture interest and Trustees' fees	£10.961	£11,183	£11.551
Reserve for premium on deb. stock redeemed	300	300	300
Year's dividend on 6 per cent. pref. shares ...	18.300	18 300	18.300
Balance	25.525	10.325	10.0 6

Although there is a balance of £25,525 after paying the dividend on the preference stock, the directors do not recommend the payment of any dividend on the ordinary shares. In view of possible contingencies resulting from the war a material reduction in the value of investments is anticipated, but the directors propose to utilise the reserve of £150,000 for adjustment of values when the permanent depreciation can be assessed. The company's cash resources have been diminished by the redemption of existing debentures to the extent of nearly £70,000, and at the same time the demand for additional working capital increases with the expansion of the manufacturing department of the business. The preference shareholders will consequently be asked to sanction additional debenture stock. The issue of the additional debentures will not necessarily mean that there will be any new interest charge incurred as temporary accommodation has hitherto been obtained from the bankers from time to time. The meeting will be held on October 15.

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 57 of the principal undertakings of the United Kingdom for the week ended October 3 give total receipts of £215,651, or £7,356 less than in the corresponding week last year. The total length of track was 2,630 miles, or 24 more than for the corresponding week. Receipts were at the rate of £81 19s. 11d. per track mile, a decrease of £3 11s. 6d. as compared with the corresponding week of last year.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate. Wks.	Aggregate. 1913-4.	Aggregate. Increase or Dec.
Anglo-Argentine	Sept. 28	£56,344	£49,012	38	£2,069,290	— £81,400
Auckland..... (28 days)	Aug. 28	19,543	21,046	8½	44,357	+ 2,747
Ballarat and Bendigo	Aug. 16	3,166	3,055	20	17,289	— 248
Brasilian St. Rly. Mlrs	May	44,820	50,237	43	523,872	+ 76,626
Brasilian Traction.....	July 25	95,720	97,183	4	388,200	+ 8,334
Brisbane	August	29,970	33,172	35	231,827	+ 24,649
British Columbia .....$	July	755,943	690,023	4	690,023	+ 65,920
Buenos Aires Pt. & City	June	6,791	6,733	26	43,250	+ 3,148
Buenos Aires Lacroze...	July	45,221	43,327	4	43,327	— 1,894
Calcutta.....Rs.	Oct. 3	73,068	58,053	39	26,79,310	+ 89,060
Cape Town	June	11,560	12,743	52	155,466	+ 18,249
Carthagena & Herrerias	Sept.	1,844	2,175	39	21,145	— 3,516
Cordoba.....	August	13,691	13,371	21	69,583	+ 2,901
East India	Sept.	2,028	1,980	8	4,092	+ 59
Kalgoorlie.....	June	2,854	2,692	26	15,522	— 1,704
La Plata.....	Sept.	4,528	4,190	39	41,852	— 3,659
Lima.....	August	33,939	29,800	35	271,607	+ 5,102
Lisbon ..... Mlrs.	July	164,715	171,179	31	1,143,064	+ 45,838
Madras (14 days) Rs.	Sept. 30	24 881	24,354	38	5,17,249	+ 33,066
Manila.....	June	133,500	132,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	387,500	+ 7,000
Mexico .....$	August	635,445	687,593	35	4,846,344	+ 334,757
Montevideo.....	August	28,829	26,075	43	809,788	— 6,693
Para	August	24,485	19,354	39	189,946	— 88,540
Port Elizabeth.....	June	3.268	3,212	52	44,931	+ 1,901
Puebla . ..... $	July	56,700	51.000	31	431,800	+ 20,100
Rangoon	Sep.	5.054	4,119	39	46,057	+ 421
Shanghai .....$	July 29	31,163	24,600	30	720,340	+ 94,215
Singapore .....$	Aug. 29	12 089	10,176	34	409,637	+ 3,783
Toronto .....$	July	811,966	866,221	31	5,893,147	+ 424,695
Winnipeg ..... $	July	336.821	846.680	31	2.438 182	+ 124.987

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	Latest Return. 1914.	Latest Return. Incr. or Dec.	Aggregate. Wks.	Aggregate. 1913-4.	Aggregate. Increase or Dec.
Aberdeen Corporation..	Sept. 30	£1,604	£1.617	+ £13	18	£31,481	+ £567
Accrington Corp.....	,, 30	599	502	— 97	26	15,137	— 103
Ayr Corporation	Oct. 3	366	288	— 78	20	9,437	— 807
Bath Electric	Sept. 30	1,078	981	— 94	39	39,078	+ 467
Birkenhead Corp.	Oct. 4	1,279	1,249	— 30	26½	34,469	+ 826
Birmingham Corp.	,, 3	12,763	11,802	— 961	27	327,187	+ 15,091
Blackburn Corporation	Sept. 30	1.390	1,217	— 173	27	87,329	+ 1,075
Blackpool Corporation	Oct. 1	2,527	1,738	— 789	27	68,498	— 9,037
Bolton Corporation	,, 4	2,791	2,526	— 265	27	76.159	+ 1,499
Bournemouth Corp.....	,, 7	2.009	1,748	— 261	27	59,926	— 3,116
Bradford Corporation..	,, 3	6,136	5,877	— 259	27	170.493	+ 8,119
Brighton Corporation..	,, 4	1.185	1.087	— 48	26½	33,038	— 40
Bristol	,, 2	8,604	8,633	+ 29	39½	342,002	+ 19,859
British Elec. Federatn.	Sept. 18	53,780	49,687	*	...	...	...
Burnley Corporation ..	Oct. 5	1,781	1,443	— 338	27	43,749	— 2,999
Burton-on-Trent Corp.	,, 4	297	288	— 9	27	8,252	+ 257
Bury Corporation.....	,, 4	1,331	1,249	— 82	26½	33,863	+ 1,601
Cardiff Corporation.....	Sept. 19	2,711	2,710	— 1	24	71,575	+ 1,954
Chatham and District..	Oct. 1	1,078	1,153	+ 75	39	37,484	+ 816
Chesterfield Corp.	,, 1	268	249	— 19	25	7,387	+ 450
Colne Corporation	,, 3	287	226	— 61	...	...	...
Cork Electric.....	,, 1	557	519	— 38	39	19,864	+ 18
Croydon Corporation ..	Sept. 25	1,793	1,584	— 209	25	45,709	+ 2,374
Darlington Corporation	Oct. 3	255	265	+ 10	27	7 289	+ 498
Derby Corporation	,, 3	1,041	968	— 73	26½	27,973	+ 909
Dover Corporation	,, 3	285	271	— 14	27	7,160	— 197
Dublin & Lucan	,, 2	141	155	+ 14	13½	2,218	— 98
Dublin United	,, 2	3.794	6,151	+ 2,357	39	232,529	+ 8,867
Dundee City	Sept. 30	1,379	1,284	— 95	19½	26,221	— 183
East Ham Corporation	Oct. 3	989	1,207	+ 218	26½	30,351	+ 3,693
Exeter Corporation	,, 2	377	361	— 16	27	9,996	+ 232
Gearless Motor 'Buses.	Sept. 19	605	502	— 103	38	18.019	+ 6,575
Glasgow Corporation ..	Oct. 3	21,881	20,577	— 1,304	17	383,368	+ 6,820
Glossop(U.Elec.Supply)	,, 3	139	106	— 33	40	5,007	— 207
Halifax Corporation ..	Sept. 29	2,209	2,048	— 161	26	60,464	+ 2,879
Hastings & District.....	,, 30	1 293	1,084	— 209	39	41,460	+ 2,537
Huddersfield Corp.	Oct. 3	2,219	2,303	+ 84	27	84,059	+ 6,150
Hull Corporation	,, 3	3,210	3,024	— 186	27	83,823	+ 1,166
Ilford U.D.C.	,, 3	458	590	+ 132	26	15,243	+ 2,964
Ilkeston Corporation ..	,, 7	187	121	— 16	27	3,636	— 111
Ipswich Corporation ..	,, 3	505	433	— 72	27	18,228	— 177
Isle of Thanet	,, 3	712	600	— 112	52	33,781	— 3,192
Kilmarnock Corp.	,, 2	180	159	— 21	20	3,452	— 260
Lanarkshire	,, 1	2,116	1,849	— 267	39	74,134	+ 7,893
Lancashire United	Sept. 30	1,791	1,586	— 205	39	64,965	+ 4,488
Leeds City	Oct. 3	8,778	8,018	— 760	27	225,851	+ 1,852
Leicester Corporation..	,, 3	2,956	2,670	— 286	40	114,118	+ 3,026
Leith Corporation	,, 3	755	676	— 79	20½	15,370	+ 243
Leyton U.D.C.	Sept. 24	1,397	1,265	— 132	24	34,914	+ 1,771
Liverpool Corporation..	Oct. 3	13 457	12,905	— 552	39½	523,278	+ 12,069
Llandudno & Colwyn B.	,, 2	291	265	— 26	44	14,239	— 1,977
London County Council	Sept. 30	43,852	43,504	— 348	26	1,149,887	+ 49,661
London Gnl. Omnibus..	Aug. 1	68,575	71,625	+ 3,050	31	1,982,031	+ 64,892
London United	Sept. 19	6,705	5,572	— 1,133	38	236,808	— 2 559
Lowestoft Corporation	Oct. 3	321	193	— 28	52	11,445	— 45
Maidstone Corporation	,, 1	277	254	— 23	27	6,042	+ 274
Manchester Corp.....	,, 3	18,428	17,021	— 1,407	27	471,902	— 1,338
Met. Elec. Trys.	Sept. 18	9,468	8,176	— 1,292	35	345,062	+ 4,025
Nat. Steam Car Co., Ld.	Oct. 7	3,681	4,719	+ 1,038	48½	210.549	+ 75.581
Nelson Corporation.....	,, 3	204	177	— 27	26½	5,445	— 408
N'castle-on-Tyne Corp.	,, 3	5,077	5,732	+ 655	27	145,281	+ 14,857
Newport (Mon.) Corp...	,, 3	798	783	— 16	27	22,838	+ 2,006
New St. Helens & Dist..	Sept. 30	855	1,002	+ 147	18	18,276	+ 943
Northampton Corp	Oct. 2	637	621	— 16	26½	16,028	— 17
Nottingham Corp.	,, 1	3,838	3,406	— 432	26½	91,542	+ 2,364
Oldham Corporation ..	,, 4	2,246	1.949	— 297	28	68,779	+ 1,678
Portsmouth Corp.....	,, 3	2,408	2,448	+ 40	27	69 249	...
Preston Corporation ..	Sept. 30	951	895	— 66	27	25,247	+ 1,026
Provincial	Oct. 3	2,052	2,202	+ 150	52	102,701	+ 1,624
Reading Corporation ..	,, 1	730	674	— 56	26	19,403	+ 706
Rhondda.....	,, 1	1.314	1.259	— 55	39	48,782	+ 1,801
Rochdale Corporation	,, 3	1,690	1,506	— 184	27	45,628	+ 1,402
Rotherham Corp.....	,, 7	997	1,130	+ 133	27	28,453	+ 1,324
Salford Corporation ..	,, 5	5,212	4,807	— 405	26	138.493	— 3,668
Sheffield Corporation..	,, 4	7,441	7,607	+ 166	27½	214.315	+ 7,031
Southampton Corp.....	Sept. 30	1,502	1,271	— 231	26	37,000	+ 475
Southend-on-Sea Corp.	,, 30	1,062	954	— 108	27	31,781	+ 2,592
South Met. Trys.	,, 18	1,228	1,071	— 157	38	42,045	+ 8,049
South Shields Corp.....	Oct. 3	727	701	— 26	26½	21,488	+ 1,598
Sunderland Corp.....	,, 4	1.401	1,324	— 77	27	41,415	+ 1,165
Sunderland District ..	Sept. 30	596	549	— 47	48	28.012	+ 1,519
Swindon Corporation ..	,, 30	184	179	— 5	26	4,833	+ 340
Torquay	Oct. 1	651	518	— 133	39	23.191	— 3.245
Trys. (M.E.T.) 'Buses	Sept. 19	8,928	5,256	— 3,672	38	336.230	+ 183,768
TynesideTrys.&Tmrds	,, 30	531	709	+ 178	14	8,216	+ 1,341
Wallasey Corporation	Oct. 3	1,233	1,148	— 85	26½	36 269	+ 1,636
Walsall Corporation ...	,, 3	672	636	— 36	40	24.970	+ 171
Walthamstow U.D.C....	,, 3	788	777	— 11	27	22,976	+ 2,250
Warrington Corp	,, 1	375	415	— 41	26	11,616	— 190
West Ham Corporation	,, 1	2,837	2.781	— 56	26	75,763	+ 3,191
Wigan Corporation	,, 1	1,522	1.401	— 121	26	39,094	— 264
Wolverhampton Corp	,, 7	909	999	— 90	28	29,418	— 601
Yorkshire (W. Riding)	,, 4	1,423	1,471	+ 48	40	58.421	+ 311

* From such of the services as were working both last year and this year the receipts show a decrease of £4,069 upon the week.

Telegrams: KRANKASES. Telephones: {4879 CENTRAL. 3846 CITY.

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THE

Tramway & Railway World

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Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

CITY OF BIRMINGHAM.

TRAMWAYS DEPARTMENT.

TENDERS FOR UNIFORM CLOTHING AND CAPS.

The Tramways Committee are prepared to receive tenders for the supply of Uniform Clothing and Caps for the Inspectors, Motormen, and Conductors.

Forms of tender may be had on application to the undersigned at the Tramway Offices, the Council House, Congreve Street, Birmingham. Tenders must be made on the form provided, and must be handed in not later than 12 o'clock noon on Monday, the 2nd day of November, 1914.

The Committee do not bind themselves to accept the lowest or any tender.

Persons tendering must at the time of tendering and at all times during the execution of the works be paying all their workpeople not less than the standard rate of wages in the districts where such workpeople are actually engaged in the execution of the work, and must be observing the hours and conditions of labour recognised by the Associations of Employers and the local organised bodies of workers in the various trades in such districts. The contractor will be held responsible for the observance of these conditions by any sub-contractor employed by him.

The contractor must also agree to comply with and conform to the provisions of the Trade Boards Act, 1909.

ALFRED BAKER,
General Manager.

The Council House,
Congreve Street, Birmingham.

SOUTH INDIAN RAILWAY COMPANY, LTD.

The South Indian Railway Company, Limited, are prepared to receive tenders for the supply of :—

No. 1. Steel Disc Wheels and Axles.
150 Pairs Broad Gauge.
150 Pairs Metre Gauge.

No. 2. Steel Rails and Fish-Plates.
About 245 Tons.

Specifications and forms of tender may be obtained at the Company's Offices.

Tenders, addressed to the Chairman and Directors of the South Indian Railway Company, Limited, marked "Tender for Wheels and Axles," or as the case may be, must be left with the undersigned not later than 1 o'clock on Wednesday, October 28, 1914.

A charge, which will not be returned, will be made of 20s. for each copy of Specification No. 1, and a charge of 10s. for each copy of Specification No. 2.

Copies of the drawings may be obtained at the office of Robert White, Esq., M.Inst.C.E., Consulting Engineer to the Company, 3, Victoria Street, Westminster, S.W.

By order, V. E. DE BROE, M.Inst.C.E.,
For Managing Director.

Company's Offices,
91, York Street, Westminster, S.W.,
October 14, 1914.

NORTH-EASTERN RAILWAY.

The Directors are prepared to receive Tenders for the supply during the six or twelve months from January 1, 1915, of the undermentioned Articles: 1. Bar Iron. 2. Iron Plates. 3. Steel Plates. 4. Iron Sheets and Hoop Iron. 5. Steel Sheets. 6. Corrugated Iron Sheets. 7. Steel Angles. 8. Mild Steel Bars. 9. Special Steel Bars. 10. Bolts and Chains for Wagons. 11. Metal Castings for Engines. 12. Metal Castings for Carriages and Wagons. 13. Metal Castings for Docks. 14. Metal Castings for Permanent Way. 15. Steel Castings for Permanent Way. 16. Steel Castings (Locomotive). 17. Malleable Castings (Permanent Way). 18. Malleable Castings (Carriage and Wagon). 19. Steel Fish Plates. 20. Cast-Iron Chairs. 21. Cast-Iron Point and Crossing Chairs. 22. Cast-Iron Socket Pipes. 23. Gas and Steam Tubes and Fittings. 24. Rain Water Goods. 25. Spring Steel. 25a. Best Cast Steel and Files. 26. Buffer and Bearing Springs for Wagons. 27. Steel Tubes for Locomotives. 28. Brass and Copper Tubes for Locomotives. 29. Copper Pipes. 30. Copper (Bolt). 31. Arc Lamp Carbons. 33. Electric Wires and Cables. 34. Electric Lighting, Sundry Fittings. 35. Lead (Pipe and Sheet). 36. White and Red Lead. 37. Linseed Oils (Boiled and Raw). 38. Oils (Paraffin and for Gasmaking). 39. Glass (Sheet and Plate). 40. Glasses (Various). 41. Glasses for Electric Arc Lamps. 42. Shovels. 43. Ropes and Cordage. 44. Tin Plates. 45. Canvas. 46. Brushes. 47. Painters' Brushes. 48. Iron Washers. 49. Nails. 50. Screws (Brass and Iron). 51. Trimming Pins. 52. Cotter Pins. 53. Hinges (Brass and Iron). 54. Steel and Iron Wire Ropes and Cords. 55. Steel and Iron Signal Wire and Signal Cord. 56. Wrought-Iron Spikes. 57. Steel Bolts and Nuts for Fishjoints. 58. Bolts, Nuts, and Rivets. 59. Cement (Best Portland). 60. Concrete and Artificial Stone Flags. 61. Flags (Stone). 62. Stone. 63. Whinstone. 64. Limestone. 65. Slag. 66. Lime. 67. Sanitary Drain Pipes. 68. Common Drain Pipes. 69. Chimney Pots. 70. Oak Trenails. 71. Oak Keys. 72. Oak Cushions. Forms of tender, specifications, and conditions, may be obtained on application to Mr. E. H. Clark, Stores Superintendent, Gateshead, and tenders must be sent in to the Secretary at York, sealed and marked "Tender for Stores," not later than 9 a.m. on Friday, October 23. The Directors do not bind themselves to accept the lowest or any tender.

R. F. DUNNELL,
Secretary.

York, October 8, 1914.

CONNAH'S QUAY URBAN DISTRICT COUNCIL.

ELECTRIC LIGHTING.

The Connah's Quay Urban District Council is prepared to receive tenders for the supplying, laying, erection of overhead and underground electric mains, services, public lighting, and plant as follows:

Contract No. 2.—Gas-engines, Suction Gas-plant, Pipework, Cooling-tank, Dynamos, Booster, Switchboard, Connections, and Storage Battery.

Contract No. 3.—Overhead and Underground Mains, Services, and Public Lighting.

Specifications, general conditions, and forms of tender may be obtained on application to the Consulting Engineers, Messrs. A. J. Leigh and Partners, Bank Chambers, Norwich, on payment of a deposit of two guineas, which will be returned on receipt of a *bona-fide* tender.

Tenders, sealed and marked "Tender for Electricity Supply Plant," must be addressed to the Clerk to the Council, Council Offices, Connah's Quay, and to be delivered to him there on or before Friday morning, November 6, 1914.

The Council do not bind themselves to accept the lowest or any tender.

A. J. LEIGH AND PARTNERS,
Consulting Engineers.

October 9, 1914.

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BENGAL AND NORTH-WESTERN RAILWAY COMPANY, LTD.

The Directors are prepared to receive tenders for the supply and delivery of :—

309 Tons Steel Material,

as per specification, to be seen at the Company's offices.

Tenders, addressed to the undersigned, and marked "Tender for Steel Material," are to be lodged not later than noon on Tuesday, the 27th day of October, 1914.

For each specification a fee of 10s. will be charged, which cannot, under any circumstances, be returned.

The Directors do not bind themselves to accept the lowest or any tender.

By order of the Board,
ALEXANDER IZAT,
Managing Director.

237, Gresham House,
Old Broad Street, London, E.C.,
October 9, 1914.

MADRAS AND SOUTHERN MAHRATTA RAILWAY CO. (LTD.).

The Directors are prepared to receive tenders for :—

about 154 tons Bolts, Nuts and Rivets,

in accordance with the specifications, which may be seen at the offices of the Company. The charge for the specifications will be one guinea, which will not be returned.

Tenders must be sent in, addressed to the Secretary, not later than 2 p.m., on Tuesday, November 3, 1914, marked "Tender for Bolts," etc.

The Directors do not bind themselves to accept the lowest or any tender.

Company's Offices :
91, York Street, Westminster, S.W.,
October 13, 1914.

POSITION VACANT.

CITY OF YORK ELECTRICITY DEPARTMENT.

APPOINTMENT OF TESTING ASSISTANT.

Applications are invited for the post of Testing Assistant in the Electricity Department of the York Corporation.

Commencing salary £91 per annum.

The selected candidate will be required to undertake the testing of meters, A.C. and D.C., mains, installations, and apparatus, and he will also be responsible for keeping records of such testing work.

Applications, giving full particulars of technical training and experience, and accompanied by not more than three recent testimonials, should reach the undersigned not later than Monday, October 26, 1914.

J. W. HAME,
Engineer and Manager.

Electricity Department, Clifford Street, York.

TRAMWAY SUPPLIES, Ltd.,
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Sole Selling Agents for S. Dixon & Sons' Tramway Material,
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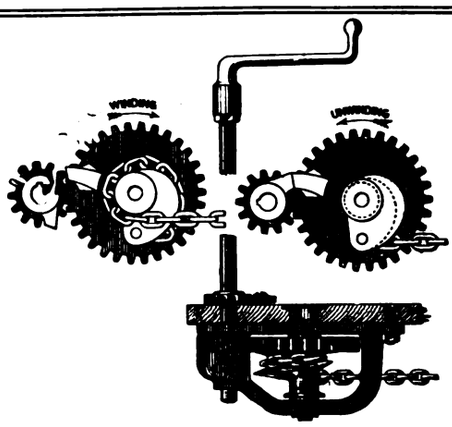

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THE
Tramway and Railway World

Established in 1892 and Published by

THE TRAMWAY & RAILWAY WORLD PUBLISHING CO., Ltd., AMBERLEY HOUSE, NORFOLK STREET, LONDON, W.C.

Sixty-four issues are published annually, including twelve large numbers which are fully illustrated and printed on art paper.

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SATURDAY, OCTOBER 17, 1914.

THE "OCEAN"
ACCIDENT AND GUARANTEE CORPORATION, LTD.,
IS THE
PREMIER INSURER OF TRAMWAYS
HEAD OFFICE:
MOORGATE STREET, LONDON, E.C.

THE WAR AND BRITISH CONTRACTS.

A great deal has been written about the breaking of contracts with German firms on account of the war and the transferring of the orders to British firms. Just before the end of the last session of Parliament attempts were made in the House of Commons to get the opinion of the Law Officers of the Crown as to the legality of such a course, but the Attorney-General would not commit himself any further than to say that circumstances in different cases varied so widely that the purchaser should take the opinion of his own solicitor. But much less has been heard about another aspect of contracts as affected by the war. It is one in regard to which there appear, fortunately, to be no legal difficulties. The matter is also one of much importance to British manufacturers. In the domain of tramways, as in many other industrial fields, contracts are entered into and orders are given for the supply of goods, materials and plant, the delivery of which is spread over considerable periods of time. In some cases the stipulation is for delivery after a certain period; in others goods—say in the way of stores—are to be delivered in instalments at certain intervals. In all such instances unforeseen circumstances may arise which materially alter the conditions for the contractor. Now an unforeseen circumstance of the most portentous kind—namely, the present war—has arisen, and among its innumerable results has been a total alteration of the conditions under which many contracts are entered into. For example, such factors have arisen as increased cost of raw materials, war risk insurance, extra cost of carriage and freight, and sometimes, no doubt, a diminished supply of some kinds of skilled labour. All these things increase the cost of production of the finished article. Thus the manufacturers who entered into contracts before the outbreak of the war, which contracts are now in process of execution, find themselves in a difficulty. The prices which have been fixed are in some cases such that in present circumstances no profit is possible; while in some extreme cases the work must be carried out at a loss. In ordinary business circles, as between manufacturers on the one hand and customers who are either companies, private firms, or individuals on the other, there is often room for some give and take and a disposition to accommodate as far as possible. But when the customer is the State or a municipality, this is not so generally the case, as some manufacturers and traders have discovered, who before the war began entered into contracts with municipal authorities to supply plant and stores for tramway and other departments at competitive prices. Since then the cost of production has, for the reasons we have mentioned, gone up considerably. It accordingly rests with the municipalities, who are the customers, to take the facts into consideration, and on good cause shown make some further allowance over and above the contract price. In other cases where, owing to impossibility of getting necessary raw materials, a contract cannot reasonably be fulfilled, it is only fair that it should be terminated without giving any further trouble to the contractor. Several instances of reasonable and even generous treatment of contractors in such ways have reached us, and in particular there is the case of the Stores and Contracts Committee of the London County Council, who, in a number of cases, have made just and highly-valued concessions to contractors. Of course, every case must be considered on its merits, but, provided there is the proper spirit, no difficulty should be experienced in arriving at a fair compromise.

CAUSES OF NOISE ON TRAMWAYS.

At a recent meeting of Leith Town Council two interesting reports were submitted regarding the reasons for noise caused by the tramcars, of which some complaint had been made. Mr. J. R. Findlay, the burgh surveyor, in his report stated that the noise was due to defects in the cars, corrugation of the rails, hammered joints and worn points and crossings. Corrugation was undoubtedly the chief cause of the noise. He pointed to the efforts which had been made, so far without success, by the Municipal Tramways Association to discover the cause of corrugation. Experience had shown that corrugation was not dependent on the number of cars passing over the rails, and that one set of cars might entirely remove the corrugations made by another set, and also that the same set of cars might cause and afterwards remove the corrugations apparently under the same conditions. The matter was very puzzling and was a question of great seriousness, as the finding of a cure had given rise to almost as much difficulty as finding the cause of the trouble. So far the only method of dealing with corrugations had been to grind them out; but corrugations had been known to reappear in a few week after grinding. On the other hand, no further trouble had in some cases been experienced after they were once ground out.

A considerable extent of tramway track in Leith was more or less effected by corrugations. These were now being dealt with, and a distinct improvement was already observable on the portions treated. The grinding out of corrugations was very expensive—not itself, but the life of the rail was reduced owing to the removal of a portion of the tread. This was all the more serious in view of the fact that so little provision had yet been made for a track renewal fund. It might be necessary to revise the estimates as to the probable life of the rails and the consequent amount likely to be required for renewals. Corrugated rails had a further disadvantage in that they sooner or later became loose and had to be repacked, and it was a matter of extreme difficulty, if not impossibility, firmly to secure a badly corrugated rail, as the constant vibration of the cars caused it to rise off the bed.

With regard to hammered joints, while the noise of a car passing over corrugated rails was continuous, the noise of a hammered joint was sharp and momentary. Hammered joints were to be found all over the Leith system with the exception of the Granton extension, where the Thermit welding was adopted. After a few years on all systems the fishplates worked loose and allowed the rail ends to move, with the result that a depression was hammered out of the on-coming rail about 3 inches from the joint. Many methods were in vogue for overcoming this difficulty, but most were somewhat expensive. Probably one of the best was to cut out a length of about 18 inches and insert a new piece of rail and have the whole securely welded. The cost of this was from £500 to

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£600 per mile of single track, and such an expense could only be justified when the rails were likely to last for a considerable time. The noise caused by hammered joints could be minimised by periodical tightening of the fishplates and welding of the hammered portion when it became sufficiently pronounced to warrant this. The oxy-acetylene welding process was being tried, and pending the result consideration of any other method of treating this joint might be delayed.

Joints and crossings only affected a small extent of the track, but there was no doubt that residents in the vicinity of crossing places suffered some annoyance. This could not be obviated, although the noise increased as the parts became worn. A number of the joints and crossings had already been renewed, and it would be necessary to renew others from time to time.

Mr. F. A. Fitzpayne, the tramway manager, reporting on the same subject, said that there was no doubt that the cars were in a better condition as regarded noise-making, apart from the question of the permanent way, than when first delivered in Leith. The following steps had been taken to make the cars run more silently since their delivery in Leith:—(1) The brake shoes, originally held with tapered half-inch square iron driven in, and which when loose caused a rattling noise, had been done away with, and were now held quite tight with a set screw and lock-washer. (2) The grease-box lids, motor-case doors, and gear lids were all rattling slack, and had now been fitted in such a way that there was no rattling of any kind. (3) The tyres, which in several cars were found to be out of truth, were now, before being put under the cars, accurately turned. (4) The plates under the journal boxes, which, owing to lack of clearance, used to chafe and cause a most unpleasant noise, had all been changed to round iron, which was quite clear and therefore noiseless. (5) The whole of the brake gear was now fitted with turned pins and bored holes in place of cast holes and black iron, which considerably reduced rattling.

Considering the time the track had been laid in Leith, there was little to complain about. An improvement in the running of the cars would be made by extending the wheel base and so reducing galloping. He recommended that two side frames with an extended wheel base should be purchased to enable a trial to be made. If this was found to be advantageous, then it would be possible to cut and to weld the side frames of the rest of the trucks, using the two side frames replaced by the new ones to work on. Recently, at a meeting of the Tramways and Light Railways Association in Newcastle, Mr. Brodie, the city engineer of Liverpool, suggested that the solution of the trouble of noise might be found by the introduction of an india-rubber tread. The result of fitting india-rubber tyres to tramway cars would undoubtedly reduce the wear on the rail surface, and should eliminate the trouble caused by hammered joints and corrugation. He at the time considered the proposal as one of purely academic interest, but subsequently a design of a rubber tyre fitted on a flanged wheel was brought to his notice. Practical difficulties are sure to be met, in the first instance, in the fitting and running of these tyres, and whether or not the saving in cost of upkeep of permanent way, etc., would be greater than the added cost owing to the use of rubber tyres, could only be discovered under running conditions It was quite impossible to report definitely on this subject, as up to the present this was quite a new proposal; but if the committee were desirous of further information, then he would suggest that further inquiry be made with a view to a car being experimentally equipped with these tyres.

LONDON COUNTY COUNCIL AND THE WAR.

Work of the Emergency Committee.

The Emergency Committee, which was appointed on August 11 to act on behalf of the London County Council in matters of urgency that might arise owing to the war, have done useful service. Arrangements have been made for the attendance of staff throughout every day and night in the office of the department of the clerk so that urgent business may be promptly dealt with. A statement drawn up by the Committee shows that the total number of reservists and volunteers from the Council's service up to October 5, 1914, amounted to 3,592, including 1,249 tramway men. The difficulties arising out of the many vacancies are being met, as far as possible, by the engagement of such temporary assistants as will continue the service of the Council in an efficient way, and by the existing staff undertaking extra work in cases in which it is not possible to introduce the services of temporary men.

The Committee have approved the regulations for the allowance of pay to officers and employees who have joined the forces. All these provide for full civil pay less Army or Navy pay, and as regards Army men of all ranks below commissioned officers, less separation allowance (if any) granted by the Crown. Civil pay will include the cash value of emoluments as determined for pension or other purposes, subject to deduction where any part of such emoluments is enjoyed by the employee's family during his absence. For all ranks below commissioned officers, Army or Navy pay and allowances (other than Army separation allowance) will be reckoned for the purpose of deduction from civil pay, at seven shillings a week. To provide employment the Committee have approved of special arrangements with regard to payments to contractors, tenders accepted by the Council, but not completed as contracts before the commencement of the war, and the responsibility of tenderers for future building operations, as regards rises in the prices of materials. The Committee are keeping observation on the general conditions of employment in London, and are making representations to various authorities with a view to meeting the exigencies of the situation.

EDINBURGH TRAMWAY LEASE.

A draft minute of agreement between the Lord Provost, Magistrates, and the Council of the City of Edinburgh and the Edinburgh and District Tramways Company, Ltd., and Messrs. Dick, Kerr, and Co. (lessees of the Edinburgh Corporation Tramways) was discussed at a meeting of the Tramway Committee of the Town Council on October 14. The draft agreement provides that the Corporation shall take over at a valuation the rolling stock, cables and other plant, stores, and movable effects used by the Tramway Company in working the tramways under the lease, and the Tramway Company shall sell and deliver the same to the Corporation on the expiry of the lease—namely, at midnight, June 30, 1919, or at an earlier date if agreed upon between the parties. The Tramway Company are to continue to keep, maintain, and, where necessary, replace, the stock and the effects in efficient working order during the lease. The price to be paid by the Corporation on the transfer of the stock and effects is to be fixed, failing agreement, by an arbiter to be agreed upon between the parties, or, failing such agreement, to be appointed by the Board of Trade. In fixing the price the contingencies of the cable system are to be kept in view, but without any consideration of goodwill.

SELF-PROPELLED CARS.

The Tramway Company are to allow the Corporation, free of charge, to make experimental trials with self-propelled cars upon such portions of the present tramways as may be arranged between the two parties provided that the trials are made at times and in a way not interfering with the ordinary working of the system. The Tramway Company are to be kept free of any loss or injury through such experiments. In the event of the Corporation constructing a tramway from a point at or near the Craiglockhart terminus to the Redford Barracks or Colinton, the Tramway Company during the lease, if desired by the Corporation, are to work the same as a tramway with self-propelled vehicles provided by the city and run in connection with the city tramways. The receipts from the traffic on these new lines will go to the Corporation, who will recoup the Tramway Company and free them from all expense and loss on the working. In the event of the Corporation acquiring the undertaking of the Colinton Tramway Company, the Corporation undertake not to construct a line by Slateford, for which that company hold statutory powers during the continuance of the present tramway lease unless with the consent of the Tramway Company.

The discussion of the agreement was adjourned.

IMPRESSED MOTOR ASSESSMENT.

Messrs. Waring and Gillow brought an action at the Bloomsbury County Court on Thursday against the Secretary of State for War and the Army Council respecting the value of a motor lorry impressed by the Army Council on the outbreak of war. For the plaintiffs it was contended that the lorry was worth £80 more than the £840 paid, and they brought the action to recover that amount. Although these proceedings were in the nature of an action, they were really an arbitration, the Judge being required to assess the value of the motor. Mr. G. Branson, counsel for the Army Council, said he would not take any objection, but as this was the first case ever brought under the present procedure of the Army Act, they ought to start on proper lines in view of future proceedings. The London managing director of the Leyland Motor Company said the motor had run about 4,000 miles when it was impressed. There was a tremendous demand for motors, and if they had had a thousand they could have sold them. The Judge, after hearing the evidence, reserved his decision.

Sheffield and Rotherham.—Rotherham Town Council have adopted a report by their Electric Light and Tramways Committee recommending the Council not to renew their running agreement with Sheffield Corporation. The principal reason for terminating the arrangement is that Sheffield Corporation wished ½d. fares to be charged on the Tinsley route, a course to which Rotherham would not consent. Rotherham Town Council have also agreed to seek powers to run trackless trolley vehicles or motor omnibuses on a number of additional routes and to obtain compulsory through running powers on the tramways with Sheffield.

Aberdeen Suburban Tramways.—At a meeting of Aberdeen Town Council on Monday the Tramways Committee reported that they had been in communication with the directors of the Aberdeen Suburban Tramways Company on the subject of the rates of pay to the employees of the company. As a result of the correspondence which has passed, the committee found that the wages had been raised from 4.60d. to 5.4d. per hour in the case of motormen, and from 3.98d. to 5.06d. per hour in the case of conductors. Under these circumstances, the committee resolved to recommend that no further action should be taken in connection with the matter. The action of the committee was approved. A remit was made to the Tramways Committee to report as to the propriety of terminating the working agreement with the Suburban Tramway Company. It was also remitted to the committee to report as to the acquisition by the Council of the undertaking of the company.

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MISCELLANEOUS NEWS AND NOTES.

Proposed Wigan Extension.—The Corporation intend to ask for powers to borrow £1,240 for additional tramway loops.

Free Passes for the Blind.—Bournemouth Corporation have decided to grant free passes for local blind people in deserving circumstances.

Institution of Electrical Engineers.—Sir John Snell will deliver his inaugural address at the opening meeting of the Institution on Thursday, October 29.

Bournemouth Omnibus Scheme.—A project for the construction of a railless traction line and the provision of trolley omnibuses to run between Poole and Sandbanks is under consideration.

South Shields Town Council intend to promote a bill in Parliament for authority to run motor omnibuses outside the borough limits. The bill will also include an application for power to extend the tramways.

Improvements at Bournemouth.—The Town Council have adopted proposals for alterations and reconstruction of the tramways at a cost of £3,903. The plan submitted by the general manager shows a doubling of the line in Holdenhurst Road and an extra loop in Ashley Road.

Glasgow Extensions.—In the last session of Parliament, Glasgow Corporation obtained authority to construct additional tramways over about 20 miles of route, and a start has now been made in the building of the first of these lines, which is to extend from Cathcart to Clarkston.

No Halfpenny Fares at Stourbridge.—At a recent meeting of the Stourbridge Town Council a letter was read from the Dudley and Stourbridge Tramways Company stating that they could not for financial reasons accede to the request by the Council for the introduction of halfpenny fares.

Ediswan Electric Service.—This is the title of a well-printed publication intended to show the progress of the Ediswan Electric Light Company, Ltd., from time to time. The first issue contains some notes on the Ediswan incandescent lamps and electric fixtures, with interesting illustrations of various types.

New Cars for Dunedin.—The manager of the Dunedin Corporation tramways, after inspecting the rolling stock of the Christchurch, the Wellington and the Auckland tramway systems, has recommended the Council to adopt for their proposed new cars the type of car used by the Auckland Tramway Company.

Underground Railway Improvements.—Moving stairways have been installed on Baker Street station between the Metropolitan Railway and the Baker Street and Waterloo Railway. This is part of the policy which is steadily pursued by the Underground Companies, substituting where advisable these escalators for lifts.

Association of Engineers-in-Charge.—Among the papers to be read during the coming session of this Association are the following: January 13, "Electric Accumulators," by Mr. R. T. Mitchell; February 10, "Boilers and Boiler Mountings," by Mr. Vernon Smith; April 14, "Autogenous Welding," by Mr. L. M. Fox.

The Polack Tyre and Rubber Co., Ltd., of London, announce that in order to secure greater efficiency and dispatch, they have combined their head offices and central stores. The registered address of their chief office is now Lime Grove, Shepherds Bush, London, W. (Telephone, Hammersmith 1,644; and telegrams, "Polackomp, Shepherds, London.")

Mexico Tramways Seized.—According to a Reuter's telegram from Mexico City, the Carranza Government have seized the Mexico Tramway Company's lines. On October 8 1,200 drivers and conductors went on strike for double wages, whereupon General Carranza threatened them with death. It is understood that the Government will work the system.

Removal of Centre Standards.—The London United Tramways Company, by arrangement with the special tramways committee of the Ealing Town Council, has agreed to remove the central standards. An estimate of the cost of removal is to be supplied to the Council, as the company decline to incur the expense unless an extension of its tramway concession is granted.

Cedes-Stoll System at Germiston, South Africa.—The tenth car completing the rolling stock for the Cedes-Stoll trackless trolley line at Germiston, arrived in South Africa toward the end of September. At that time the service was working with smoothness and regularity, and the "Rand Daily Mail" says that the public, especially in the outlying districts, are beginning to experience the benefits of the system.

Railless Traction at Bradford.—Bradford Tramways Committee have recommended the fitting of trolley omnibuses with a patent earthing and automatic steering device, at a cost of £14 per omnibus. The offer of the Leeds Corporation to take over the obligations of Bradford Council with respect to ten of the railless trolley vehicles now being constructed under a contract for the Bradford Corporation has been accepted.

A Bradford Extension.—Major Druitt, on behalf of the Board of Trade, on October 8 inspected the new tramway from Bingley to Crossflats belonging to Bingley Council and constructed by Bradford Corporation tramway department. The length of the line is about a mile. It will be worked under lease by Bradford Corporation in the same way as the section from Nab Wood to Bingley. The through fare from Bradford to Crossflats is to be 4d.

Accommodation for L.C.C. Motor Lorries.—The London County Council, on April 7, 1914, decided to purchase eight motor lorries for use in the permanent way section of the tramways department. Covered accommodation in the depot for lorries used in connection with the southern section of the system was already provided, but similar provision had to be made for the northern section. The Council has now approved a recommendation of the Highways Committee that accommodation for motor lorries at the Leven Road, Poplar, and Leighton Road, Kentish Town, permanent way depots should be provided, at a cost of £2,825

Through Running at Pontypridd and Porth.—An effort is being made to secure through running services between Pontypridd and Porth over the lines of the Pontypridd Corporation tramways and the Rhondda Tramway Company's lines. Members of the Corporation Committee are to interview representatives of the tramway company with a view to obtaining through services, which it is thought would be a great convenience to the public and improve the traffic receipts.

Bournemouth Tramways and the War.—Mr. I. Bulfin, general manager of the Bournemouth Corporation tramways, states that over 120 men have joined the colours from his department, this representing about 25 per cent. of the staff. The Tramways Committee have decided to pay half wages to the men on service. In order to alleviate unemployment in the district, it has been decided to proceed with the reconstruction of the tramways in Holdenhurst Road, converting them from single line with passing-places to double line.

Sudden Stoppage of a Car Justified.—An action was raised in Cardiff County Court, before Judge Hill Kelly, by Mrs. Rosanna Spargo, against Cardiff Corporation and Griffiths and Sons, clothiers, for damages in respect of injuries received as a result of a collision between a Cardiff tramcar, in which the complainant was a passenger, and a motor van belonging to Messrs. Griffiths. The tramcar was approaching a crossing when a motor car in the act of crossing the road was caught and pinned against an electric standard. The tramcar was pulled up suddenly in an effort to avoid a collision, and as a result of the sudden stoppage the complainant and her baby were thrown to the ground and sustained a shock so great that she had to be medically attended for seven weeks. The case against the owners of the motor, Messrs. Griffiths and Son, was dismissed. For the Corporation it was contended that the sudden pulling up of the car in the effort to avoid a collision was reasonable and proper, and that they ought not to be held responsible for injuries resulting from such action. The Judge upheld the view that there had been no negligence and gave judgment for the Corporation.

L.C.C. TRAMWAY MATTERS.

The first meeting of the London County Council after the long recess took place on Tuesday, when the members were confronted with an agenda paper of over 100 pages. The reports of the Highways Committee covered a great variety of details indicating that the Committee had been by no means idle during the recess. Particulars of a number of contracts recently arranged are given in another column.

MAGNITUDE OF THE TRAMWAYS TRAFFIC.

In the course of the annual address from the chair, Lord Peel said: "The Council's tramways carried no less than 522,952,640 passengers during the year. The total passenger receipts from the tramways amounted to £2,268,668. The number of cheap return and transfer fares had been considerably increased. The capacity of a number of sub-stations has had to be enlarged to cope with the heavy power load required to work the tramways. Trailer cars had been introduced, and additional through running arrangements with outside tramway authorities have been entered into."

STORES AND CONTRACTS.

The Stores and Contracts Committee in a report with reference to the effect of the war on the general stores and maintenance contracts, state that a number of contractors found themselves unable to meet the full obligations under their contracts. In some cases they could only supply subject to the payment of an extra sum to cover war risk, extra cost of carriage, and similar expenses, and in others they are unable to supply owing to the impossibility of obtaining further stocks. In these circumstances the Committee have terminated certain contracts and are obtaining supplies as and when required under special quotations. In a few other cases arrangements have been made with the contractors which the Committee think are equitable for dealing with the situation. Each case is being considered on its merits, and the special arrangements made only apply to the order given after a new and serious condition of affairs not contemplated in the contract has actually arisen. From time to time tenders for the supply of stores from firms controlled by firms wholly or largely by persons of German or Austrian nationality have been accepted, and the Committee is arranging, if the facts justify the course, to have no further dealings with the firms in question.

THROUGH RUNNING.

The Highways Committee reported that additional through running services had been arranged with the Metropolitan Electric Tramways, Limited, and that in connection with the Bexley Urban District Council Tramways a 9d. return fare had been made between the London termini and Northumberland Heath.

ASSISTANT AND ACTING ASSISTANT NIGHT INSPECTORS.

The commencing rate of pay of assistant night inspectors and acting assistant night inspectors in the tramways department is 38s. a week, and is 1s. a week less than the maximum rate of pay of conductors, who form a lower grade of employees. The Highways Committee recommended that the commencing rate of pay of assistant night inspectors should be 40s. a week, and that the commencing rate of pay of acting assistant night inspectors should be 39s. a week.

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THERMIT WELDED JOINTS.

On October 29, 1912, March 4, 1913, and April 7, 1914, the Council approved the arrangement made with Thermit, Limited, for the welding of rail joints. The total expenditure incurred has now amounted to £2,815 19s.

CONCESSIONS TO CONTRACTORS IN VIEW OF THE WAR.

The London County Council on March 19, 1912, accepted the tender of Wilsons, Pease and Co., Ltd., for the supply of cast-iron shoes during the 12 months ending April 30, 1913, at the price of £8 17s. 6d. a ton for each item. The contract was subsequently extended for a further period of two years at the same price. The company has now stated that, owing to the war, it is compelled to pay extra insurance premiums on all shipments, and it has asked the Council to pay an additional 2s. a ton to cover the additional expense. In the circumstances the Highways Committee have agreed to pay the extra charge.

The Council on June 23, 1914, entered into a contract with Johnson, Riddle and Co., Ltd., for the supply of guide maps for the Council's tramways, at the price of 8s. 6d. a 1,000. The company now stated that owing to the increased cost of raw material and freight, due to the war, it was compelled to pay £1 a ton extra for the paper required in connection with the contract, and it asked the Council to pay this extra charge. The amount of paper required for the completion of the contract is about 14 tons, and it was agreed to pay the additional sum of £14.

EXTENSIONS TO GREENWICH GENERATING STATION.

The Council on July 28 invited tenders from selected firms for certain additions and alterations required in connection with the increase of plant at Greenwich generating station. The work consists of the extension of the existing coal bunkers, the provision of additional coal bunkers, workshops, ash hoppers, observation tower and accommodation for piermaster. The cost of the work is estimated at £17,700, and the Highways Committee recommended that the expenditure of this amount on capital account should be sanctioned.

All tramway reports were adopted.

CONTRACTS AND ORDERS.

The Stirling Boiler Company are supplying two sets of boiler tubes and of replace links for two stokers at Neepsend power house, Sheffield.

Cole, Marehent and Morley, Ltd., have received an order for 50 sets of power-brake equipment for trolley vehicles from the Bradford Corporation at a price of £72 per set.

A. Reyrolle and Co., Ltd., have a contract from Sheffield Electricity Committee for fourteen high-tension three-phase switch gear panels for the Neepsend station.

The British Mannesmann Tube Company are supplying 220 light steel poles to the Bradford Corporation for overhead trolley railless traction equipment at £4 11s. each; 80 medium steel poles at £6 8s. 1d. each, and 10 heavy steel poles at £7 8s. 7d. each.

Doncaster Corporation have ordered four tramcar bodies from the United Electric Car Company, Ltd. The cars will be provided with Dick, Kerr and Co.'s electrical equipment and Peckham pendulum trucks. A supplemental estimate for the purchase of six new cars in addition to the above four is to be submitted to the Finance Committee for approval.

Leeds Tramways New Offices.—W. Airy and Son have been awarded a contract by Leeds Corporation for the building of the new tramway offices in Swinegate and Briggate on a schedule of prices appertaining to the firm's contract for the adjacent new tramway depôt. The Council have agreed to make application for sanction to borrow £32,000 for the erection of the new offices.

L.C.C. CONTRACTS.

At the meeting of the London County Council on Tuesday the Highways Committee reported that the following contracts had been arranged:—

RE-ARRANGEMENT OF TRAMWAYS SUB-STATIONS AND PLANT, ETC.

John Marsland and Sons (accepted tender)	£2,436
A. Roberts and Co.	2,521
Markham and Markham	2,561
J. and C. Bowyer	2,730
G. Godson and Sons	2,852
Charles Wall, Ltd.	2,918
High and low tension cables:—	
Western Electric Co. (accepted tender)	24,601
British Insulated and Helsby Cables	24,524
Johnson and Phillips	24,689
Callender's Cable and Construction Co.	24,824
W. T. Henley's Telegraph Works Co.	25,100
W. T. Glover and Co., Ltd.	26,110
Siemens Bros. and Co.	26,149
Laying of stoneware cable ducts, etc.:—	
Foote and Milne (accepted tender)	2,268
William Griffiths and Co.	2,555
May, Mortimer and Co.	5,971

SUPPLY OF TRAMWAY MATERIAL.

During the recess the Highways Committee purchased the following tramway material:—

	Approximate amount
200 pairs of motor axle bearings—The Anti-Attrition Metal Co., Ltd.	£200
18,000 feet rubber hose for magnetic brakes—D. Moseley and Sons, Ltd.	149
Six tons of plain tread plate—J. Billingham	108
1,200 carborundum blocks for rail grinding—Carborundum Co., Ltd.	263
200 cast-iron yokes—Anderston Foundry Co., Ltd., and J. Martin and Son (100 each)	139
One ton of tinned copper strip—London Electric Wire Co. and Smiths, Ltd.	96
3,000 rail clips for extended yokes—Armstrong, Stevens and Son, Ltd.	200
Bolts, bars, clips, etc.—Bayliss, Jones and Bayliss, Ltd.	568
1,700 yokes—Anderston Foundry Co., Ltd.	1,132

SUPPLY OF STEEL TYRES.

At the end of April the Council accepted a contract of John Batt and Co. (London), Ltd., for the supply of 3,000 driving and 2,000 pony wheel tyres at a price of 19s. 4d. for each driving, and 16s. 7d. for each pony wheel. The company proposed to sub-let the manufacture of the tyres to certain German firms. Having regard to the outbreak of war, the Highways Committee have made arrangements for tyres to be purchased as follows:—

Henry Bessemer and Co., Ltd.—3,000 driving wheel tyres at £1 3s. each, and 2,000 pony wheel tyres at £1 each.

Cammell Laird and Co., Ltd.—500 driving wheel tyres at 22s. each, and 500 pony wheel tyres at 19s. each.

METALLIC FILAMENT TRACTION LAMPS.

The tender of Siemens Brothers Dynamo Works for the supply of 125,000 metallic filament traction lamps at £6,313 2s. 6d., has been accepted. Tenders were received from the following selected firms: Siemens Brothers Dynamo Works, Ltd., Edison and Swan United Electric Light Company, Ltd., the Electrical Company, Ltd., and the General Electric Company, Ltd.

PERSONAL.

Mr. J. H. Clothier, chief electrical engineer of the St. Annes-on-Sea Corporation, has been granted an increase of £50 per annum in salary.

Mr. Fred Coutts, general manager of Paisley Tramways, is serving as captain of the 5th Black Watch, and at the same time is directing the Paisley tramways.

Mr. N. B. Macaulay, senior engineer-in-charge of the Rhondda Tramways Company at Porth, has been appointed senior engineer-in-charge at Newport, Mon., electricity works.

Mr. S. Pearson, assistant works superintendent at Thornbury depôt of the Bradford tramways, has been appointed works superintendent in place of Mr. T. Richardson, who has resigned.

Mr. V. G. Lironi, electrical engineer of Portsmouth, has been granted an honorarium of £150 in consideration of the extra work involved in carrying out the last three tramway extensions.

Mr. H. R. Griffiths has been appointed by the Great Western Railway Company as divisional superintendent at Bristol in succession to Mr. Charles Kislingbury, who has retired after upwards of forty years' service with the company. Mr. Griffiths has been Mr. Kislingbury's assistant for ten years.

Melbourne Railway Electrification.—Mr. G. H. Wion, of the Pennsylvania Railroad Company, has been appointed by the Victorian Railway Commissioners as engineer to assist in the installation and supervision of the power and automatic signalling system in connection with the scheme for the electrification of the Melbourne suburban lines.

Mr. John Bromley has been elected secretary of the Associated Society of Locomotive Engineers and Firemen in succession to the late Mr. Albert Fox. For the last 4½ years Mr. Bromley has been the Society's organiser in Manchester and district. He was formerly an engine driver on the Great Western Railway. His influence as the secretary of the men's side of the locomotive conciliation boards of the Hull and Barnsley and North Staffordshire Railway Companies has been successful in establishing amicable relations between these companies and their employees, while at the same time he obtained many improvements in the conditions of the service.

Mr. Walter Rutherford, managing director of Dick, Kerr and Co., Ltd., was, on Thursday, highly complimented at the annual meeting by Mr. Claude T. Cayley, the chairman of the company. Mr Cayley, in replying to a vote of thanks to himself, to the board and to the staff, said that they owed a great debt of gratitude to their managing director, Mr. Rutherford, for the extremely able manner in which he had managed the affairs of the company, both practically and financially. It had been quite an eye-opener to him (Mr. Cayley) and he wished to bring it to the minds of the shareholders that the directors immensely appreciate their managing director's efforts and hard work in connection with the affairs of the company.

Northampton Tramway Manager.—A special meeting of Northampton Town Council was held on Monday to consider the position of Mr. J. Gottschalk, the tramway manager, who, it will be remembered, has been violently attacked because he is of German birth. He had put himself unreservedly in the hands of the tramway committee, who passed a vote of confidence in him, and confirmed it at a subsequent meeting. As has been previously explained, Mr. Gottschalk left Germany when he was 18 years of age, and has lived in England for the last 36 years. He has been tramway manager in Northampton for 12 years. He married an English wife, and he has a son who has served in the British Army. He, however, did not apply for naturalisation until after the war broke out, but he received his papers about a fortnight ago. The special meeting of the Council had before them a resolution passed by a meeting of ratepayers asking for the dismissal of Mr. Gottschalk, and also a resolution passed by the local trades council urging that he should be retained on the ground that he was a naturalised British subject with no offence alleged against him. Mr. T. Lewis moved the adoption of the report of the Tramways Committee containing the record of that body's confidence in the manager, and Mr. Woods proposed an amendment for the dismissal of Mr. Gottschalk with three months' salary in lieu of notice. The amendment was rejected by 27 votes to 18. A further amendment to suspend Mr. Gottschalk without salary during the continuation of the war was defeated by 28 to 18, and the report of the Committee was adopted.

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FINANCIAL REPORTS AND MEETINGS.

South Western Railway Electrification.—The issue of £1,000,000 5 per cent. redeemable preference stock of the London and South Western Railway has been largely over-subscribed. The issue, it will be remembered, is in connection with the electrification of the suburban lines of the company.

Portsmouth Corporation Tramways.—The report of the general manager, Mr. W. R. Spaven, for the year ending March 31, 1914, shows an increase in revenue which, although counteracted to some extent by a growth in the working expenses, leaves the total amount for disposal somewhat larger than for either of the two previous years, as will be seen from the following summary:—

	1913–14	1912–13	1911–12
	£	£	£
Traffic receipts	115,167	108,087	110,792
Other receipts	1,823	1,745	1,810
Total receipts	116,990	109,832	112,602
Working expenses	57,620	52,226	51,879
Gross profit on working	59,370	57,606	60,723
Interest on credit balances	829	764	689
Total amount for disposal	60,199	58,370	61,412
Appropriated as under:—			
Sinking fund	18,263	17,462	17,458
Interest on capital	21,593	20,875	20,798
Income tax	1,301	964	1,109
Renewals fund	8,123	8,412	8,694
Reserve and insurance fund	3,000	3,000	2,000
Depreciation on price of Consols	—	350	846
Contribution in aid of rates	5,000	4,000	4,000
Erection of shelter in Greetham Street	119	—	—
Laying feeder cables	32	—	—
Purchase of land	—	—	427
Carried forward	2,768	3,307	6,080

The total revenue works out at 11.204d. per car mile, as compared with 12.229d. per car mile for the previous year. There was, however, an increase of £7,158 in the receipts, which is attributed to the opening of extensions, and this also explains the decrease in the earnings per car mile. The working expenses averaged 5.518d. per car mile, as compared with 5,815d. per car mile for the previous year. The number of passengers carried was 26,266,342, an increase of 1,745,695 over the previous year, and the car miles run were 2,506,058, an increase of 350,550. Energy consumption averaged 1.103 units per car mile. The ratio of working expenses to receipts was 49.25 per cent. The Corporation now have 34¾ miles of single track and 100 cars.

THE TRAMWAY AND RAILWAY WORLD.

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B.E.T. Capital Reduction Scheme Deferred.—Early in July particulars were published of a scheme for the reduction of the capital of the British Electric Traction Company, Ltd. We are now officially informed that stockholders, having been asked to state before October 1 whether or not they were in favour of the directors' proposals, 1,589 replies were received before August 4 last, and 348 have been received since. The replies show that a large majority of each class of stockholder and of the Income Certificate holders who have expressed their views are in favour of the scheme. The directors are of opinion that but for the intervening state of war a much larger number of replies would have been received, which probably would have increased the majority in favour of their proposals. Under the existing conditions, however, the directors consider that the wisest course is to defer any further action in regard to the scheme for the present.

Ayr Corporation Tramways.—The annual report for the year ending May 15, 1914, issued by the general manager, Mr. William Grant, shows a considerable increase in the traffic receipts. The total revenue for the year amounted to £19,377, an increase of £3,082, while the working expenses were £10,662, leaving a balance of £8,715, which was sufficient to provide for repayment of sinking fund and interest, leaving £2,502 to be placed to the depreciation account and £1,141 to the reserve fund. In view of the fact that the results have been achieved in the face of keen competition by motor chars-à-banc, the result is all the more satisfactory. Receipts per car mile work out at 10.45d., and working expenses were 5.75d. per car mile, the ratio of working expenses to receipts being 55 per cent. The consumption of electrical energy has been reduced to .94 units per car mile, a very low figure. During the past year two new cars were ordered from Messrs. Hurst, Nelson and Company. After some respite from corrugations, the manager remarks that these have again appeared on the rails. The worst of them were ground out during the past winter, and the work will require to be again undertaken in the following winter.

DICK, KERR AND COMPANY, LTD.

SATISFACTORY PROGRESS.

The ordinary general meeting of the shareholders of Dick, Kerr and Company, Ltd., was held on Thursday at Cannon Street Hotel, London, E.C., Mr. Claude T. Cayley, chairman of the board, presiding.

The CHAIRMAN, in moving the adoption of the directors' report and accounts (a summary of which appeared in our issue of last Saturday), said that the directors were very pleased that they had so satisfactory a report to put before the meeting. Their profit-earning had greatly increased. Two years ago it was down to £3,000, last year it rose to £30,000, and now it was up to nearly £45,000. The directors and the staff would do all in their power to continue such an advance. In regard to the prospects for the immediate future and what permanent effects were to be anticipated as a result of the war, it was necessary, in order to understand the position, to emphasise the ramifications of the company's business. They had reached a condition of having two distinct sections, the contracting department and the department for the manufacturing apparatus, which were approximately equal in importance. In regard to the contracting department, he would mention, as an instance of the class of work dealt with, the construction of a railway 90 kilometres long for the Government of Portuguese West Africa which had just been completed, and a contract lately entered into with the Metropolitan Water Board for the construction of a very large reservoir representing some six years' work. In the electrical manufacturing department he instanced the contracts now in hand with the London and South Western Railway Company for the complete equipment of their generating station for their suburban electrification scheme, and the contract with the Lancashire and Yorkshire Railway Company for the supply of the machinery and apparatus for the complete electrification of their Manchester suburban lines. The company had also a third department, chiefly concerned with the supply to customers of general engineering machinery and electrical supplies. Thus, while some departments would be detrimentally affected by the war, others might be expected to derive certain advantages. If, for some time, the construction of public works would be deferred, the Metropolitan Water Board contract should fill the breach. In regard to the prospects of the manufacture of electrical machinery, to whatever extent Germany might be crippled financially for the time being, she would make stupendous efforts to regain her lost markets. In this she would be aided by the financial help given by German banks. It was gratifying that British manufacturers had, to some extent, been able to put up a fight, considering the limited resources at their disposal. Taking all the indications into consideration, the directors were of opinion that they would have to tide over a lean year or two before they could hope to see the dawn of an increased demand for the heavy class of machinery in which they specialised. In their supply or merchant business they were already experiencing an increased turn-over, and there was a steadily-growing demand for their metallic filament lamps. The company's organisation was such as to inspire confidence in its ability to hold its own.

Mr. R. H. PRESTWICH, deputy chairman, seconded the motion, and it was unanimously agreed to without discussion.

The retiring directors, Mr. Cayley and Mr. Thos. D. Lingard, were re-elected.

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A meeting of the preference shareholders was subsequently held, when a resolution was adopted sanctioning the creation and issue of debentures to a maximum amount which would bring up the total debenture stock, including the first mortgage, to a total of £650,000. The chairman explained that the new issue would be second debentures, and its total maximum amount would be about £240,000. It did not follow that the directors proposed to issue that amount, but they were taking the power. The company had been fairly large borrowers from the bank, and instead of paying interest on bankers' overdrafts they would pay the interest to debenture holders. That would not affect, to any extent, the net result in the profit and loss account. The resolution was adopted.

COAL MARKET.

October 16, 1914.

Messrs. Locket and Judkins, of 3, Fenchurch Avenue, E.C., supply the following quotations, which are subject to daily alteration, and the supply of the best descriptions is dependent on the requirements of H.M. Admiralty:—

	Friday, October 16.	A Year Ago.	Two Years Ago.
London, free into barge in Thames—	s. d.	s. d.	s. d.
Best Admiralty Welsh (large)	28 6	24 6	22 6
Best Seconds	26 6	23 6	22 0
Ordinary Drys	25 6	21 0	20 3
Best Washed Nuts	23 0	21 0	19 6
Best Washed Peas	21 6	19 6	18 0
Cardiff, f.o.b.—			
Best Admiralty (large)	22 0	20 0	17 0
Best Seconds	20 0	19 0	16 6
Ordinary Drys	19 0	16 6	14 9
Best Washed Nuts	16 6	16 6	14 0
Best Washed Peas	15 0	15 0	12 6
Newcastle, f.o.b.—			
Best Steams	13 3	16 0	13 6
Best Seconds	12 3	13 6	12 6
Smalls	8 9	8 6	10 0

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 57 of the principal undertakings of the United Kingdom for the week ended October 10 give total receipts of £214,770, or £772 less than in the corresponding week last year. The total length of track was 2,630 miles, or 24 more than for the corresponding week. Receipts were at the rate of £81 13s. 3d. per track mile, a decrease of £1 0s. 11d. as compared with the corresponding week of last year.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Anglo-Argentine	Oct. 7	£56,823	£53,843	40	£2,172,387	— £40,156
Auckland..... (28 days)	Aug. 28	19,543	21,046	8⅛	44,357	+ 2,747
Ballarat and Bendigo	Aug. 16	3,166	3,055	20	17,282	— 248
Brazilian St. Rly. Mlrs	May	44,820	50,237	43	523,872	+ 76,626
Brazilian Traction.....	July 25	95,720	97,133	4	388,200	+ 8,334
Brisbane	August	29,970	33,172	35	231,827	+ 24,649
British Columbia .....$	July	755,943	690,023	4	690,023	+ 65 920
Buenos Aires Pt. & City	June	6,791	6,738	26	43,250	+ 3,143
Buenos Aires Lacroze..	July	45,221	43,327	4	43,327	-- 1,894
Calcutta.....Rs.	Oct. 10	69,438	53,243	40	27,32,553	+ 72,865
Cape Town	June	11,560	12,742	52	155,466	+ 13,249
Carthagena & Herrerias	Sept.	1,814	2,175	39	21,145	— 3,516
Cordoba.....	August	13,691	13,871	21	69,583	+ 2,201
East India	Sept.	2,028	1,980	8	4,092	+ 59
Kalgoorlie	July	2,796	2,552	30	18,074	— 1,948
La Plata	Sept.	4,528	4,190	39	41,852	— 8,659
Lima	August	33,939	29,800	35	271,607	+ 5,102
Lisbon ..... Mlrs.	July	164,715	171,179	31	1,143,064	+ 45,838
Madras (14 days) Rs.	Sept. 30	24 881	24,354	38	5,17,249	+ 33,066
Manila	June	133,500	132,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	357.500	+ 7,000
Mexico .....$	August	635,445	687,593	35	4,846,344	+ 331,757
Montevideo	August	28,829	26,075	43	309,788	— 6,693
Para	August	24,485	19,354	39	189,016	— 38,540
Port Elizabeth	June	3,268	3,212	52	44,931	+ 1.901
Puebla ..... $	August	52,900	60 500	35	482,300	+ 17,700
Rangoon	Sep.	5 054	4,119	39	46,057	+ 421
Shanghai .....$	July 29	31,163	24,600	30	720,340	+ 94,215
Singapore .....$	Sept. 5	14 459	9,852	35	419,495	+ 8,314
Toronto .....$	July	811,966	866,221	31	5,692,147	+ 424,695
Winnipeg..... $	July	336,821	346,630	31	2,488,182	+ 128.987

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	Latest Return. 1914.	Incr. or Dec.	Aggregate. Wks	Aggregate. 1913-4.	Increase or Dec.
Aberdeen Corporation..	Oct. 7	£1,636	£1,563	— £73	19	£33,044	+ £494
Accrington Corp.....	,, 7	576	451	— 125	27	15,588	— 228
Ayr Corporation	,, 10	262	251	— 11	21	9,688	— 619
Bath Electric	,, 7	1,061	872	— 189	40	39,950	+ 277
Birkenhead Corp.	,, 11	1,245	1.210	— 35	27½	35,679	— 861
Birmingham Corp.	,, 10	12,281	11,702	— 579	28	338,889	+ 14,512
Blackburn Corporation	,, 7	1,331	1,180	— 151	28	38,508	+ 928
Blackpool Corporation	,, 8	1,291	1,004	— 287	28	59,502	— 9,353
Bolton Corporation	,, 11	2,748	2,482	— 266	28	78,641	+ 1,233
Bournemouth Corp.....	,, 14	1,935	1.631	— 304	28	61,558	— 3,419
Bradford Corporation..	,, 10	5.797	5,995	+ 198	28	176,493	+ 8,317
Brighton Corporation..	,, 11	1 047	1,018	— 29	27½	34,056	— 68
Bristol	,, 9	7,761	8,156	+ 395	40½	350,158	+ 20,254
British Elec. Federatn.	Sept. 18	53,760	49,687	*	...	...	...
Burnley Corporation ..	Oct. 10	1,804	1,410	— 394	28	45,159	— 3,393
Burton-on-Trent Corp.	,, 11	333	308	— 25	28	8,561	+ 263
Bury Corporation.....	,, 11	1,378	1,262	— 116	27½	40,127	+ 1,501
Cardiff Corporation.....	Sept. 19	2,711	2,710	— 1	24	71,575	+ 1,954
Chatham and District..	Oct. 8	1,012	1,069	+ 57	40	38,553	+ 872
Chesterfield Corp.	,, 8	260	244	— 16	27	7,632	+ 434
Colne Corporation	,, 10	271	255	— 16	..	...	...
Cork Electric.....	,, 8	519	523	+ 4	40	20,387	+ 23
Croydon Corporation ..	,, 2	1,317	1,674	— 143	26	47,383	+ 2,232
Darlington Corporation	,, 3	255	265	+ 10	27	7 289	+ 496
Derby Corporation	,, 10	1,000	949	— 51	27½	28,923	+ 858
Dover Corporation	,, 10	247	263	+ 16	28	7,424	— 181
Dublin & Lucan	,, 9	109	139	+ 30	14½	2,358	— 63
Dublin United	,, 9	3,707	5,822	+ 2,115	40	238,351	+ 11,014
Dundee City	,, 7	1,389	1,340	— 49	20½	27,561	— 232
East Ham Corporation	,, 10	998	1,221	+ 223	27½	31,572	+ 3,916
Exeter Corporation	,, 9	346	350	+ 4	28	10,346	+ 236
Gearless Motor 'Buses.	Sept. 19	605	502	— 103	38	18 019	+ 6,575
Glasgow Corporation ..	Oct. 10	21,009	20,632	— 377	18	384,000	+ 6,359
Glossop (U. Elec. Supply)	,, 10	129	99	— 30	41	5,106	— 237
Halifax Corporation ..	,, 6	2,019	2,097	+ 77	27	62,561	+ 2,957
Hastings & District.....	,, 7	1 045	999	— 56	40	42,449	+ 2,592
Huddersfield Corp.	,, 10	2,078	2.437	+ 359	28	86,427	+ 6,508
Hull Corporation	,, 10	3,866	3,861	— 505	28	87,184	+ 661
Ilford U.D.C.	,, 10	439	568	+ 129	27	15,811	+ 3,074
Ilkeston Corporation ..	,, 14	132	122	— 10	28	3,757	— 121
Ipswich Corporation ..	,, 10	444	413	— 31	28	12,687	— 23
Isle of Thanet	,, 10	497	487	— 10	1½	728	— 144
Kilmarnock Corp.	,, 10	164	150	— 14	21	3,602	— 274
Lanarkshire	,, 8	1,870	1,787	— 83	40	75,921	+ 7,811
Lancashire United	,, 7	1,650	1,517	— 133	40	66,497	+ 4,311
Leeds City	,, 10	8,166	7,985	— 181	28	238,837	+ 1,549
Leicester Corporation..	,, 10	3,039	2,938	— 101	41	117,057	+ 3,003
Leith Corporation	,, 10	698	688	— 10	21	15.958	+ 233
Leyton U.D.C.	,, 8	1,341	1,343	+ 2	26	37,598	+ 1,664
Liverpool Corporation..	,, 10	12 941	12.579	— 362	40½	538,857	+ 11,708
Llandudno & Colwyn B.	,, 9	216	226	— 20	45	14.465	— 1,297
London County Council	,, 7	43,145	44,589	+ 1 894	27	1,194,876	+ 51,055
London Gnl. Omnibus..	Aug. 1	68,575	71.625	+ 3,050	31	1,982,031	+ 64 892
London United	Sept. 18	6.705	5.572	— 1,133	38	236,808	— 2 559
Lowestoft Corporation	Oct. 10	202	177	— 25	1½	266	— 62
Maidstone Corporation	,, 8	227	217	— 10	28	6 259	+ 264
Manchester Corp.....	,, 10	17.591	16,904	— 687	28	488,806	— 2,276
Met. Elec. Trys.	Sept. 18	9.468	8,176	— 1,292	35	345.052	+ 4.025
Nat. Steam Car Co., Ld.	Oct. 14	3,666	4,184	+ 518	49½	214.733	+ 76.099
Nelson Corporation.....	,, 10	194	144	— 50	27½	5,590	— 458
N'castle-on-Tyne Corp.	,, 10	5,090	5,708	+ 618	28	150,935	+ 15,471
Newport (Mon.) Corp...	,, 10	797	778	— 19	28	23,617	+ 1,988
New St. Helens & Dist..	,, 7	807	952	+ 145	14	14,937	+ 1,081
Northampton Corp	,, 9	569	602	+ 33	27	16 630	+ 16
Nottingham Corp.	,, 8	4,295	3,879	— 416	27½	96,421	+ 1,948
Oldham Corporation ..	,, 11	2,238	1.953	— 285	29	65,733	+ 1,393
Portsmouth Corp.....	,, 10	2,167	2,347	+ 180	28	71 596	...
Preston Corporation ..	,, 7	865	873	+ 8	28	26,162	+ 1,039
Provincial	,, 10	1,835	2,098	+ 263	1½	3,107	+ 461
Reading Corporation ...	,, 8	709	688	— 21	27	20,091	+ 684
Rhondda.....	,, 8	1,265	1,203	— 62	40	49,985	+ 1,739
Rochdale Corporation	,, 11	1,587	1,458	— 129	28	47,087	+ 1,273
Rotherham Corp.....	,, 14	1,046	1,109	+ 63	28	29,563	+ 1,387
Salford Corporation ..	,, 12	5,227	4,799	— 428	27	143 292	— 4,073
Sheffield Corporation..	,, 11	7,716	7,682	— 34	28½	221,997	+ 7,236
Southampton Corp.....	,, 7	1,401	1,257	— 144	27	38,257	+ 330
Southend-on-Sea Corp.	,, 7	879	846	— 33	28	32.687	+ 2,563
South Met. Trys.	Sept. 18	1,228	1,071	— 157	38	42,045	+ 8,049
South Shields Corp.....	Oct. 10	714	699	— 15	27½	22,182	+ 1,573
Sunderland Corp.....	,, 12	1.416	1,346	— 70	28	42,762	+ 1,025
Sunderland District ...	Sept. 30	596	549	— 47	43	28.012	+ 1,519
Swindon Corporation ...	Oct. 7	174	180	+ 6	27	5 013	+ 348
Torquay	,, 8	591	491	— 100	40	23 688	— 3,345
Trys. (M.E.T.) 'Buses	Sept. 19	8,926	5,256	— 3,672	38	336,230	+ 183,768
TynesideTrys. & Tmrds	Oct. 7	487	684	+ 197	15	9,500	+ 1,538
Wallasey Corporation	,, 10	1,150	1,119	— 11	27½	37.389	+ 1,625
Walsall Corporation ...	,, 10	625	616	— 9	41	25,586	+ 161
Walthamstow U.D.C....	,, 10	691	748	+ 57	28	23,706	+ 2,367
Warrington Corp	,, 1	375	415	— 41	26	11,616	— 190
West Ham Corporation	,, 8	2,739	2.765	+ 26	27	73,528	+ 3,217
Wigan Corporation	,, 8	1,505	1,414	— 91	27	40,515	— 356
Wolverhampton Corp	,, 14	1,162	1,008	— 154	29	30,428	— 755
Yorkshire (W. Riding)	,, 11	1,435	1,464	+ 29	41	59.885	+ 341

* From such of the services as were working both last year and this year the receipts show a decrease of £4,089 upon the week.

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THE

Tramway & Railway World

Vol. XXXVI. No. 21. LONDON, SATURDAY, OCTOBER 24, 1914. [Established in 1892.

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Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

DUBLIN UNITED TRAMWAYS COMPANY (1896), LTD.

CONTRACTS.

The Company is prepared to receive tenders for the supply of General Stores, including Car Fittings, Iron, Steel Castings, Oils, Paints, Glass, Brushes, Ironmongery, Harness Materials, Electric Supplies, Timber, etc., for the year ending December 31, 1915.

Forms of tender (price 2s. each), conditions, and all information can be obtained, and patterns seen, at the Secretary's Office, 9, Upper Sackville Street, from October 26 to November 7, 1914.

Prices and quality being equal, preference will be given to goods of Irish manufacture.

Tenders, sealed and marked on the outside "Tenders for Stores," and addressed to the Chairman, Dublin United Tramways Company, must be lodged with me on or before November 9, 1914.

By order, R. S. TRESILIAN,
Secretary.

9, Upper Sackville Street, Dublin,
October 19, 1914.

YORKSHIRE (WEST RIDING) ELECTRIC TRAMWAYS CO., LTD.

TENDERS FOR STORES.

The Yorkshire (West Riding) Electric Tramways Company, Limited, invite tenders for the supply during the year ending December 31, 1915, of the following Stores:—

Schedule No.
3. Bolts, Nuts, and Washers.
4. Brushes and Painters' Tools.
6. Copper, Brass and Gunmetal Castings and Fittings.
8. Cleaning Cloths, Cotton Waste, etc.
9. Drysalters' Sundries.
10. Electrical Lamps, Fittings, etc.
12. Engineers' Furnishings, etc.
13. Fibre, Leather Rubber, etc.
17. Insulating Materials, Tapes, Compound, etc.
19. Iron and Steel.
20. Lubricants, etc.
23. Overhead Fittings.
24. Paints, Varnish and Transfers.
25. Printing, Books and Stationery.
29. Springs.
30. Steel Castings, etc. (Manufactured).
31. Timber.
32. Uniform Clothing.

Schedules may be obtained from the Central Offices, Belle Isle, Wakefield, after November 9. A charge of 1s. (which is not returnable) is made for each schedule in duplicate, and a remittance covering the charge for schedules required must be sent with each application.

Samples may be inspected at the Company's Stores at Belle Isle, Wakefield, on November 18, 19, and 20 only, between the hours of 10 a.m. and 5 p.m.

Contractors are invited to call and examine the samples before tendering.

Sealed tenders must reach this address not later than 9 a.m. on Friday, December 4.

H. ENGLAND,
General Manager.

Belle Isle, Wakefield.

BLACKPOOL CORPORATION.

The Electricity Committee invite tenders from British manufacturers for the supply, delivery, and erection of additional Plant at the Electricity Works as under:—

Section 1 to 5. { Water Tube Boiler (40,000 lbs. duty). Mechanical Stokers. Economiser. Steel Chimney. Cold Storage Hopper.

Section 6.—One 1,500 kw. Alternator.

Section 7.—Surface Condenser and Auxiliaries.

Copies of specification and formal conditions of tender may be obtained from the undersigned upon receipt of *bona-fide* application and intention to tender from actual manufacturers under each section.

Tenders, sealed and endorsed "Tender for Section ——," and addressed to the Chairman of the Electricity Committee, must be received not later than November 19, 1914.

The Corporation do not bind themselves to accept the lowest or any tender.

CHARLES FURNESS,
Borough Electrical Engineer and Tramways General Manager.

Electricity Works,
West Caroline Street, Blackpool,
October 20, 1914.

URBAN DISTRICT OF WOOD GREEN.

FIRST-AID MOTOR ENGINE.

The Council are prepared to receive the names of persons or firms desirous of tendering for the supply of a First-Aid Motor Engine.

No applications will be considered from German or Austrian firms or from Limited Companies where the greater portion of the share capital is held by persons of either nationality.

Last day for receiving names Wednesday, October 28, 1914, at 5 p.m. By order, WM. P. HARDING,
Clerk of the Council.

Town Hall, Wood Green,
October 15, 1914.

TOTTENHAM URBAN DISTRICT COUNCIL.

TO MOTOR VEHICLE MANUFACTURERS.

The Council invite tenders for a Petrol Motor Ambulance.

The general conditions and form of tender can be obtained on application to Mr. W. H. Prescott, M.Inst.C.E., Engineer to the Council, at the Town Hall, Tottenham.

Persons tendering will be required to deposit with the Treasurer when handing in their tender a Bank of England note, or cash, the sum of £5, which will be forfeited by the person whose tender is accepted if the contract be not executed within seven days from the date he is informed it is ready for signature, otherwise it will be repaid. This deposit will be returned to the parties tendering who are unsuccessful.

The contractor will be required to pay all workmen on the Council's work the recognised trade union rate of wages. A schedule of such wages will be inserted in the contract.

Canvassing members of the Council is strictly prohibited, and if any members, agents, or representatives of firms tendering for this work interview or canvass members of this Council, tenders sent in from such firms will be immediately disqualified.

Sealed tenders, on the form supplied, endorsed "Tender for Petrol Motor Ambulance," to be delivered to me by twelve o'clock noon on Tuesday, November 3rd, 1914.

No other form of tender will be received.

Security will be required for the due performance of the contract.

The Council will not be bound to accept the lowest or any tender.

By order, VINCENT A. BALLS,
Acting Clerk of the Council.

Town Hall, Tottenham,
October 16, 1914.

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PORTSMOUTH CORPORATION TRAMWAYS.

CONTRACT.

The Tramways Committee invite tenders for the supply and delivery of :—

150 Oilskin Coats for Motormen.
300 Pairs of Oilskin Leggings for Motormen and Conductors.
150 Sou' Westers for Motormen.
30 Oilskin Coats for Point Boys.
30 Pairs of Oilskin Leggings for Point Boys.
30 Sou' Westers for Point Boys.

Specification and conditions, and form of tender, may be obtained, and sample garments seen on application to the General Manager, Town Hall, Portsmouth.

Sealed tenders, endorsed "Tender for Oilskins, etc.," to be delivered to the Town Clerk, Town Hall, Portsmouth, not later than 12 noon on Monday, November 2, 1914.

The Committee do not undertake to accept the lowest or any tender, and reserve the right to accept the whole or any portion of the tender.

W. R. Spaven,
General Manager.

Town Hall, Portsmouth,
October 21, 1914.

WALSALL CORPORATION TRAMWAYS.

STORES.

The Corporation of Walsall invite tenders for the supply to the Tramways Department for the year 1915 of the undermentioned Stores :—

Motor Grease.	Insulating Material.
Lubricating Oil.	Trolley Wheels.
Cleaning Material.	Cement.
Pinion Wheels.	Etc., etc.

Forms of tender and further information may be obtained at the Tramway Manager's Office, St. Paul's Buildings, The Bridge, Walsall.

Tenders, sealed and endorsed "Tender for Stores," are to be sent to H. Lee, Esq., Town Clerk, Council House, Walsall, on or before Saturday, November 7.

Samples (which will not be paid for by the Corporation) are to be sent to St. Paul's Buildings, The Bridge, Walsall.

The Corporation do not bind themselves to accept the lowest or any tender, and they will not accept the tender of any firm or person paying to their workmen less than the standard rate of wages.

R. L. Horsfield,
General Manager.

St. Paul's Buildings, The Bridge, Walsall,
October 21, 1914.

POSITION VACANT.

COUNTY BOROUGH OF HUDDERSFIELD.

ENGINEERING AND SURVEYING ASSISTANT.

The Corporation invite applications for the appointment, in the Borough Engineer's Department, of a temporary Engineering and Surveying Assistant, at a salary of £120 per annum.

The person appointed must be thoroughly qualified to fulfil the duties of the office, particulars of which may be obtained on application to the Borough Engineer.

Application, in candidate's own handwriting, giving full particulars as to experience, age, present and previous appointments, accompanied by not more than four recent testimonials, to be addressed to me, the undersigned, not later than 10 a.m., October 28, 1914.

Canvassing will disqualify.

K. F. Campbell, M.Inst.C.E., M.I.E.E.,
Borough Engineer and Surveyor.

Huddersfield, October 14, 1914.

TRAMWAY SUPPLIES, Ltd.,
Tramway Engineers,
Sole Selling Agents for S. Dixon & Sons' Tramway Material,
160, WOODHOUSE LANE, LEEDS.
Sole Manufacturers of
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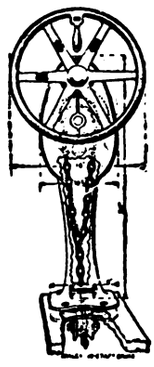
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THE
Tramway and Railway World

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THE TRAMWAY & RAILWAY WORLD PUBLISHING CO., Ltd.,
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SATURDAY, OCTOBER 24, 1914.

THE "OCEAN"
ACCIDENT AND GUARANTEE CORPORATION, LTD.,
IS THE
PREMIER INSURER OF TRAMWAYS
HEAD OFFICE:
MOORGATE STREET, LONDON, E.C.

THE PREVENTION OF ACCIDENTS.

At the present time, when tramway managers have been so fully occupied with reorganisations of staff and services due to the war, it is likely that the special campaign which has been called the "safety first movement" is receiving less attention than it merits. It may be hoped and believed, however, that the special stress to tramway organisation caused by the war is now for the most part over. Hence the chief officers of tramway undertakings who have in the past been diligent in the safety first movement should soon be able to renew the campaign, while any who have not taken special action ought to do so as occasion requires No one should imagine that work of this sort can be done and finished once for all. Even if those responsible for a tramway undertaking had so educated their employees and their public that accidents were reduced to a negligible quantity, that happy state of affairs would not continue unless the efforts also were continued. Tramway employees change, old men giving place to young; and fresh multitudes of children are constantly reaching the dangerous age before experience has taught them carefulness, when they are so apt to be knocked down by tramcars and other vehicles. All these newcomers need instruction. Coroners' inquests show how frequently fatal accidents occur despite all that is done. In regard to drivers and conductors, there should be no difficulty in keeping up the course of systematic instruction on the methods of avoiding accidents, so that those who already know may never forget, and so that the new hands may thoroughly learn. One class of accidents differs from all others, in that it could practically be abolished by a single change in arrangements. The accidents referred to are caused by people stepping off cars in motion. Any arrangement which enables the conductor never to leave his place on the rear platform must result in the abolition of such casualties, because the conductor could always stop any attempt by a passenger to step off until the car stopped. The case of pedestrians being knocked down by cars calls for the education not merely of the drivers but of the public. Methods of exhorting the adult members of the public are fairly obvious, but a more elaborate process is necessary with regard to children. School instruction with plenty of diagrams and pictures of a character sufficiently sensational to impress the youthful imagination should be continuous and systematic, and such instruction should, of course, refer to other vehicles as well as tramcars. Speeds of mechanically-propelled road vehicles tend to increase, and, correspondingly, the need for instruction grows. In America, where high car speeds have been usual ever since the advent of electric traction, the safety first movement has been very active in many places for a number of years. By lectures to drivers, special school instruction to children, and advertising campaigns for the general public much has been and is being done. In some cases the management make a feature of getting old employees to instruct the younger ones. The whole movement, both here and abroad, is an admirable one, and those responsible for tramway operation are not likely to forget that the attempts to prevent accidents, besides benefiting the public, have the collateral advantage of minimising claims for damages against tramway authorities.

L.C.C. TRAMWAY MATTERS.

TRAMWAY BANKING ACCOUNTS.

The Finance Committee of the London County Council, in a report on payments on behalf of the Council, submitted at last Tuesday's meeting, stated that when the new procedure came into force on October 1 they were charged with the duty of ordering and making payments out of any fund or account kept by the Council for that purpose, and the Special Committee on Procedure was submitting to the Council regulations specifying the accounts out of which such payments would be ordered. To comply with the provisions of the Local Government Act, 1888, it would be necessary for the Council to order periodical payments out of the main accounts of the county fund in order to provide funds out of which payments will be made by their order. The Finance Committee now propose that advantage should be taken of the present occasion to bring the whole procedure into line, and they suggest that three principal banking accounts of the county fund be kept as follows:—General account, education account, and tramways account. These accounts will serve as feeding accounts. As regards the tramway receipts and payments, there would be two banking accounts instead of one. It is proposed to re-name the present tramways account the tramways expenditure account, and to use this account for the purpose of making payments for tramway purposes in accordance with orders made by the Finance Committee. All receipts in respect of the tramways will be carried to a new account to be called the tramways account, and from this account the Council will be recommended periodically to transfer to the tramways expenditure account such sums as will be required to meet payments for tramway purposes.

COAT OF ARMS.

The General Purposes Committee reported that they had received the grant of the Patent of Arms of the Council, together with the Royal Warrant signed by His Majesty. The arms are as follows: Barry wave of six on a chief the cross of Saint George charged with a Lion of England. The shield ensigned by a mural crown, the whole as in the drawing annexed to the Warrant. In the Patent the arms are described as follows: Barry wave of six azure and argent on a chief of the last the cross of St. George charged with a Lion of England the shield ensigned with a mural crown gold.

REPAYMENT OF TRAMWAY EXPENDITURE.

The Finance Committee are considering the settlement of the question of the periods for repayment of tramway expenditure generally, and when reporting on the estimates for the repayment of the expenditure involved in connection with the extensions to the Greenwich generating station, they recommended that the repayment of the expenditure should be postponed pending the settlement of the whole question.

CHANGES IN HIGHWAYS COMMITTEE.

Major A. C. H. Kennard and Capt. E. W. Morrison-Bell, being on service with His Majesty's forces, have resigned their membership of the Committee. Messrs. D. Davies and William Haydon have been appointed members in their places.

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LEGAL PROCEEDINGS FOR OBSTRUCTION OF TRAMCARS, ETC.

The Highways Committee reported that proceedings for the wilful obstruction of tramcars had been taken in 14 cases. In 12 of these fines and costs were inflicted ranging from 10s. to 44s. During the period from July 22 to October 7, 16 summonses were taken out by the Council for assaults on tramcar conductors and other officers in connection with the working of the tramways. In 13 of these cases convictions were obtained. Nineteen summonses were taken out by the police against the Council's motormen for exceeding the speed limit and other offences. In sixteen of these cases convictions were obtained.

PETROL-ELECTRIC TURNTABLE LADDERS.

Tenders were invited during the recess from W. A. Stevens, Ltd., of Maidstone, and the Railless Electric Traction, Ltd., for the supply of two petrol-electric chassis to carry Magirus ladders. W. A. Stevens' offer to supply the two chassis required at £762 each was accepted.

The various proposals were approved.

MISCELLANEOUS NEWS AND NOTES.

Current Consumption at Ilford.—The price of energy for the tramways department has been fixed by the Electricity Committee at 1 1/8d. per unit during the year ending March 31 next.

Mexico Tramways.—The "Financial Times" states that the news is confirmed that the Government has taken forcible possession of the undertaking of the Mexico Tramways Company, and is working the lines.

Glasgow Harbour Tunnel.—Glasgow Tramways Committee have confirmed a recommendation of a sub-committee that the Corporation should take a ten years' lease of Glasgow Harbour tunnel from the company owning it, at a rent of £3,000 a year. The cost of maintenance and the rates are to be paid by the Corporation.

Asuncion Tramway, Light and Power Company.—In the Chancery Division on October 16, Mr. Justice Warrington appointed a receiver and manager of the Asuncion Tramway, Light and Power Company, the property of which is in Paraguay. Mr. Clauson, K.C., said the application was made on the ground that the company had not executed local mortgages as security for the debenture stock.

The King of Roumania as a Tramway Passenger.—According to the "Daily Mirror," the late King of Roumania sometimes travelled with his subjects in tramway cars. The conductor of a car was much embarrassed when he recognised the King on one occasion, as he did not know whether he should ask for a fare or not. The King paid his fare, but not the ordinary one. He handed the equivalent of 8s. to the conductor, and insisted that his change should not be returned to him, so that the conductor probably wished he had royal passengers every day.

Leeds Tramways and Electricity Department.—At a recent meeting of the Council, a resolution was moved for the appointment of separate committees for the management of the tramways and electricity departments. Alderman Brown said he hoped the motion would be withdrawn. There had been a growing feeling of late among all parties that the management of the electricity department should be reconsidered. Alderman Smithson, chairman of the tramways committee, agreed with this view, but said it would be better to leave the question over for the new Council to decide, and after further discussion the motion was withdrawn.

Opposition to a London Scheme.—For a long time an active opposition has been carried on locally to a proposal by London County Council to construct a tramway along New Cut from Waterloo Road to Blackfriars Road, and thus to do away with the present dead end near Waterloo Station. The locality is a poor one, and in the ordinary way would probably not object to a tramway, but it is alleged that the line would involve the abolition of the New Cut market, which is the principal street market of South London. A petition against the scheme, signed by over 6,000 people, has been presented to the Lambeth Borough Council.

Regenerative v. Series Parallel Control.—At a meeting of Rawtenstall Town Council, Mr. J. Taylor asked how it was that the receipts on the tramways were down 15 per cent., while the cost of the fuel supplied for the tramways was up 5 per cent. Ald. Coope, in reply, said that the reason why the receipts were down was that they had not sufficient traffic. As to the increase in the cost for fuel, they had turned most of the cars from the regenerative control system to the series parallel system, and it had taken more current to drive a car than it did in the other way. The change had to be made in order to meet the requirements of the Board of Trade.

Electric Vehicle Committee.—At a meeting of this Committee, held on October 2, Mr. R. A. Chattock presiding, the final design for a standard sign for charging stations and garages was approved. The sign may be either an illuminated sign or an enamelled iron plate. Messrs. Reyrolle and Company submitted a sample charging plug and receptacle for the inspection of the Committee, who approved it and ordered it to be submitted to the Engineering Standards Committee. The standard range of charging voltage has been fixed by the Committee at 85 to 120. This voltage is regarded as suitable for 44 lead cells as a maximum. The Committee recommend the use of a loud electrically-operated horn as the best type of signal.

London County Council and Foreign Orders.—The Special Committee on Rules for Procedure have advised the London County Council to adopt the following rule with reference to the purchase of manufactured articles: "In the purchase of manufactured articles preference shall, whenever possible, be given to those goods which have been wholly or in part manufactured within the United Kingdom." This is an encouraging indication that a change is taking place in the attitude of the Council toward home industry. Not infrequently we have had occasion to note that the Council have placed orders abroad which could quite as well have been executed in this country. It is true that in some of these cases there was a certain saving effected in placing the order abroad, but considering that the work in many cases, especially in the manufacture of rails, included a large proportion of expense for labour, and that this money was paid to foreign workmen, the net result probably left a generous balance in favour of the foreigner.

Omnibuses for Southampton.—The deputation which recently inspected certain vehicles, reported in favour of the Tilling-Stevens and Thornycroft types. In their report the deputation stated that users of the Tilling-Stevens type found that the maintenance of the electrical apparatus was negligible, and as the construction of the armatures is almost identical with that of the tramway motor, no difficulty would be experienced in dealing with any repairs by the existing staff. Under the special circumstances, therefore, the Tramways Committee was recommended to obtain quotations from the two firms mentioned for omnibuses fitted with single deck bodies. The Committee has, however, deferred the consideration of the whole subject for the present.

Metropolitan Association of Electric Tramways Managers.—A meeting of the members of the above Association was held on Friday, October 16, at the Municipal and County Club, Whitehall Court, S.W., when the following were present: Messrs. Ullman (East Ham), chairman; Schofield (Leyton), vice-chairman; Bruce (L.C.C.), Coveney (Erith), Harvey (Ilford), Moffet (West Ham), Goodyer (Croydon), hon. secretary; Mason (South Metropolitan), Mackinnon (London United), and Hammond (Metropolitan Electric). Messrs. Birkett (Southend) and C. Mittelhausen were also present. Letters of inability to attend were received from Messrs. Fell (L.C.C.), Stokes (Bexley), and Murray (Walthamstow). Messrs. Ullmann and Schofield were re-elected chairman and vice-chairman respectively, and Mr. Goodyer was re-elected hon. secretary. Various matters of interest were discussed.

Electric Omnibuses for York.—At the October meeting of the City Council, Alderman Meyer, in supporting the recommendation of the electricity and tramways committee for the purchase of four electric omnibuses, said that the intention of the committee was to carry out the tramway extensions for which power was obtained in the Corporation's Bill, but they wished to test the routes by means of electric omnibuses before proceeding with the tramway construction. They were not giving up the powers for tramway construction, but they intended to test the earning power of the routes, and he believed the vehicles now ordered would admirably serve the purpose. Councillor Sessions said that the electric omnibuses would cost £350 per vehicle more than the petrol omnibus, but they had the testimony of the tramway manager at Southend that the electric omnibus could be run at less cost than the petrol omnibus. The price of the omnibuses was not fixed, so that the committee could purchase larger tyres for the back wheels if they found it desirable.

Northampton Tramway Manager.—Although the Town Council, after prolonged discussion, refused to dismiss Mr. Gottschalk, the tramway manager of Northampton, because he was of German birth and had not been naturalised previous to the war, the Tramways Committee have now decided to suspend him for the period of the war. As already mentioned in these columns, Mr. Gottschalk, although born in Hanover, has lived in England for 27 years. Although he had not become naturalised previous to the war, papers were subsequently granted to him. Mr. Gottschalk on the outbreak of the war fully explained his position to the Tramways Committee, and it may be mentioned that he married an English wife and has a son serving in the British Army. The agitation against him has been fomented by a small section of the public which seems at length to have captured the Tramways Committee. Latterly the matter appears to have been made a question of local politics, and it seemed probable that if he was retained some contests on the subject would be forced at the municipal election, notwithstanding an agreement previously reached that there should be no contests this year.

A Conductor Acting as Driver.—The Court of Appeal have granted a new trial in the action of Ricketts *v.* Thomas Tilling, Limited, which was tried some time ago before Mr. Justice Atkin and a common jury. The plaintiff sought to recover damages for personal injuries alleged to have been caused owing to the negligence of the defendants' servants. When the accident occurred the plaintiff was standing on the foot pavement in Hackney Road, an omnibus belonging to the defendants was driven along, and for some reason the conductor was driving while the driver was sitting by his side. The omnibus mounted the pavement and knocked down several persons, one of whom was killed. The plaintiff was injured, and for a considerable time was unable to follow his calling. The judge held that there was no case to go to the jury, as there was no evidence that the conductor was authorised by the defendants to drive the omnibus or that the driver was under the necessity of delegating his duties. In the Court of Appeal Lord Justice Buckley said that the driver owed a duty to his employers to prevent someone else from driving, or, if he allowed it, to see that the other person drove properly. In his opinion it was a question for the jury whether the driver had committed a breach of his duty. Lord Justice Phillimore and Lord Justice Pickford were of the same opinion, and a new trial was accordingly ordered.

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Birmingham Extensions.—At a meeting of Birmingham Town Council on Tuesday, Mr. Harrison Barrow presented a report by the Tramways Committee recommending that the Committee should be authorised to proceed with the construction of a tramway along Whitmore Street, Ford Street, and Lodge Road, and the extension of an existing tramway at Selly Oak along the Bristol Road, through Northfield and Longbridge to the City boundary at Lickey Road, Rednal; further that they should be authorised to provide additional rolling stock at a total estimated cost of £128,240; that the Finance Committee should be instructed to borrow that amount, and that they should determine in what proportions the yearly sums required to be provided in respect of the sum of £41,958 for the purchase of lands and execution of street improvements should be defrayed out of the revenue arising from the tramway undertaking and the borough fund respectively. He mentioned that it was proposed to lay about two-thirds of the tramway on a separate sleeper track, which would mean a considerable saving in the cost of construction. Mr. Neville Chamberlain moved that the part of the report dealing with the tramway from Selly Oak to Rednal should be deferred until the adjoining lands had been made the subject of a town-planning scheme. Mr. Pepper moved a further amendment indefinitely postponing this part of the scheme on the ground of its being inopportune owing to the stringency of the financial position. After discussion, Mr. Pepper's amendment was carried by 55 votes to 51, and the recommendation of the Committee respecting the Whitmore Street tramway was agreed.

CONTRACTS AND ORDERS.

Messrs. James Thompson and Son are supplying a vulcanising plant and lathe for a garage for the Glasgow Tramways.

The Edison Battery Company have an order from the Glasgow Corporation Electricity Committee for three electrical vehicles at a total price of £2,446.

W. A. Stevens, Ltd., have received an order from the Fire Brigade Committee of the London County Council for two petrol-electric chassis to carry Magirus ladders.

The Peacock Brake Company have an order from Southend-on-Sea Tramways Committee for the supply of brakes and sand gear for three electrically-driven coal wagons.

The British Westinghouse Electric and Manufacturing Company are to supply a 1,500 kw. rotary converter and transformer, with switchgear, and a 1,200 kw. transformer and switchgear to Chesterfield Corporation.

New Plymouth Tramways (N.Z.).—It is reported that Messrs. Greenshields and Co., of Wellington, have been awarded the contract for the construction of electric tramways, including the supply of cars and sub-station equipment, for the New Plymouth Borough Council. The cost is stated to be £49,926, and the work is to be completed by the end of next year.

PERSONAL.

Mr. G. Broadhurst has been appointed electrical engineer of Basingstoke at a salary of £170 per annum.

Mr. G. H. Browne, chief assistant engineer and deputy manager of the Ilkeston Corporation tramways and electricity department, has been appointed temporary engineer and manager during the absence of Mr. L. C. Bellamy with the Royal Naval Division.

Mr. L. W. Horne has been appointed superintendent of the line of the London and North Western Railway. Mr. W. M. Turnbull becomes assistant superintendent of the line, and Mr. E. C. Grindley has been appointed indoor assistant to the superintendent of the line.

Mr. C. W. Shepherd, general manager of the Edinburgh and District Tramways Company, and Mr. Robert Aitkin, accountant, have been presented by the board of directors, the former with a silver loving cup and the latter with a silver rose bowl on the occasion of their silver weddings.

Indian State Railways.—The Secretary of State for India in Council has, subject to the usual conditions, appointed the five undermentioned gentlemen to be assistant traffic superintendents on Indian State Railways:—Messrs. R. Q. Cruttwell, V. L. Dean, D. H. Harrison, R. Proudlock, and E. A. Sims.

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Sydney (N.S.W.) City Council have placed a contract with the Australian Metal Company, acting for the Tudor Accumulator Company, for section A of the storage battery, the amount being £24,711. This contract was originally placed with the same firm acting as agents for the Allgemeine Electricitats Gesellschaft, of Berlin.

Mr. R. C. Bullough, manager of the Colchester Corporation tramways, has received a pleasant token of appreciation from the Town Council. Since the war broke out Colchester has been a great centre for troops, and one result has been a very large increase in the traffic on the tramways. The Tramways Committee reported to the last meeting of the Council that having considered the manager's special report relative to the extra number of passengers carried during the past few weeks the Committee resolved to place on record their appreciation of the manner in which Mr. Bullough and the whole of the staff had worked during a very difficult period. Mr. Jarmin, in moving the adoption of the report, said that they were now carrying 24,000 passengers weekly above the normal figures, and the receipts had advanced by nearly £100 weekly. It had from the first been decided to charge each man in His Majesty's Service who was a tramway passenger a 1d. fare for any distance, and very large numbers of men had availed themselves of the concession. It was also to be noted that the large increase of traffic had to be dealt with within about four hours, namely, from 5.30 to 9.30 each evening. It would accordingly be well understood that the manager and the staff were very fully occupied during that period. Notwithstanding the temporary loss of about 25 per cent. of the tramway employees, that being the proportion which had joined the colours, the service had been well and efficiently maintained, while new men were being instructed. The average receipts per car mile had increased from about 8d. to 11½d.

FINANCIAL REPORTS AND MEETINGS.

Lisbon Electric Tramways Company.—Interim dividend of 3 per cent., free of tax, on the ordinary shares.

The Brazilian Traction, Light and Power Company, Ltd., announce the usual quarterly dividend of 1½ per cent. on the ordinary shares.

Sao Paulo Tramway, Light, and Power Company.—Dividend of 2½ per cent. on the capital stock, payable on November 2. A year ago the dividend was at the same rate.

Brisbane Electric Tramways Investment Company.—The directors have decided to postpone the payment of the final call of £2 on the ordinary shares from October 15 to November 16. The usual interim dividend of 4s. per share on the ordinary shares will be paid on December 1.

Norwich Electric Tramways Company report a profit for the year ended June 30 of £11,076, and including £141 brought forward there is an available balance of £11,217. The directors propose to place £2,500 to the reserve fund account, and to pay a dividend of 3 per cent., requiring £7,920, leaving £797 to be carried forward.

Leeds City Tramways.—The half-yearly statement of income and expenditure presented to Leeds Tramways Committee on Monday by Mr. J. B. Hamilton, the manager, shows that the working resulted in a net surplus of £45,465. The receipts, which amounted to £224,185, showed an increase of £1,343, compared with the corresponding period of last year, and the number of passengers was 48,543,198, against 47,996,569.

Belfast Tramways Half-year.—It is reported that the total receipts for the six months from April 1 to September 30 amounted to £141,020, an increase of £4,108 over the same period of 1913, and that the profit on working for the past half-year is £60,854, or £3,000 more than in the summer half of 1913-14, while the surplus profit for the six months is £15,239, an increase of over £3,000 on last year's summer half. After deducting allowance for depreciation, it is estimated that the available profit for the six months is more than £6,000.

Auckland Electric Tramways.—The directors have declared a final dividend of 1s. per share, free of income-tax, on the ordinary shares, making 1s. 7d. per share for the past year, placing £22,500 to renewals and depreciation account, and £10,000 to reserve (making that fund £112,500), and carrying £5,876 forward. Mr. Tegetmeier, presiding at the annual meeting of shareholders in London on Thursday, said that with the complete collapse of the strike and the defeat of the federation of labour they could look forward to industrial peace in New Zealand for some time to come. For the first two months of the war the receipts had gone up by over £4,000. The report was adopted.

Liverpool Tramways Increasing Revenue.—Ald. Fred. Smith, replying to a vote of thanks accorded to him for his year's service as chairman of the Liverpool Tramways and Electric Power and Lighting Committee, at a meeting on Wednesday, said that the first nine months of the present year had provided a record over all previous years as regards the total receipts and the number of passengers carried. In 1914 the receipts for the first nine months were £517,240, against £505,016 in the corresponding period of 1913. The passengers carried numbered 109,902,170, against 107,457,935 last year. The mileage run was 10,455,543, against 10,034,045. The earnings per car mile in 1914 were 11.87d., against 12.07d. in 1913. A vote of thanks was also passed to Major Clarke, the deputy-chairman of the committee.

Mexico Tramways Company.—The report for the year 1913 states that the net revenue from operation amounted to 3,164,756 pesos, as compared with 3,018,950 pesos for the year 1912. This revenue,

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converted into Canadian currency at the average monthly rate of exchange, gave a profit from operation of 1,340,557 dols gold, to which has been added the income from securities and other sources —namely, 1,391,650 dols—and the credit balance of 1,462,928 dols brought forward, making a total credit on profit and loss account of 4,195,136 dols. Out of this sum have been paid the current expenses and fixed charges, amounting to 1,473,419 dols, and dividends aggregating 7 per cent. on the share capital, leaving a credit on profit and loss account of 1,382,967 dols, which has been carried forward. Since January 1st, 1914, the board has considered it advisable, owing to the continued state of political unrest in Mexico and the consequent heavy fall in exchange, to defer for the present the payment of further dividends on the share capital.

COAL MARKET.

October 23, 1914.

Messrs. Locket and Judkins, of 3, Fenchurch Avenue, E.C., supply the following quotations, which are liable to alteration from day to day, and the supply of Welsh coal is subject to the requirements of H.M. Admiralty.

	Friday, October 23.	Last week.	A Year Ago.	Two Years Ago.
London, free into barge in Thames—	s. d.	s. d.	s. d.	s. d.
Best Admiralty Welsh (large)	28 6 ..	28 6 ..	24 6 ..	22 6
Best Seconds..	26 6 ..	26 6 ..	23 9 ..	22 0
Ordinary Drys	26 6 ..	25 6 ..	21 0 ..	20 3
Best Washed Nuts	23 0 ..	23 0 ..	21 0 ..	19 6
Best Washed Peas	21 6 ..	21 6 ..	19 6 ..	18 0
Cardiff, f.o.b.—				
Best Admiralty (large) ..	22 0 ..	22 0 ..	20 0 ..	17 0
Best Seconds	20 0 ..	20 0 ..	19 3 ..	16 6
Ordinary Drys	20 0 ..	19 0 ..	16 6 ..	14 9
Best Washed Nuts	16 6 ..	16 6 ..	16 6 ..	14 0
Best Washed Peas	15 0 ..	15 0 ..	15 0 ..	12 6
Newcastle, f.o.b.—				
Best Steams	13 3 ..	13 3 ..	15 0 ..	14 0
Best Seconds	12 3 ..	12 3 ..	13 0 ..	13 0
Smalls	8 6 ..	8 9 ..	8 0 ..	10 0

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 57 of the principal undertakings of the United Kingdom for the week ended October 17 give total receipts of £211,743, or £4,859 less than in the corresponding week last year. The total length of track was 2,630 miles, or 24 more than for the corresponding week. Receipts were at the rate of £80 10s. 2d. per track mile, a decrease of £2 12s. 2d. as compared with the corresponding week of last year.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Anglo-Argentine	Oct. 14	£52,547	£52,353	41	£2,224,740	— £40,350
Auckland (28 days)	Aug. 28	19,543	21,046	8½	44,387	+ 2,747
Ballarat and Bendigo	Aug. 16	3,166	3,055	20	17,282	— 246
Brazilian St. Rly. Mlrs	May	44,820	50,237	43	523,872	+ 76,636
Brazilian Traction	July 25	95,720	97,133	4	398,200	+ 8,334
Brisbane	August	29,970	33,172	35	231,827	+ 24,649
British Columbia —$	August	770,623	674,812	9	1,364,885	— 161,736
Buenos Aires Pt. & City	June	6,791	6,733	26	43,250	+ 3,148
Buenos Aires Lacrosse	July	45,221	43,327	4	45,327	— 1,894
Calcutta Rs.	Oct. 17	53,404	54,516	41	27,87,069	+ 73,977
Cape Town	June	11,560	12,742	52	155,466	+ 18,242
Carthagena & Herreria	Sept.	1,344	2,175	39	21,145	— 3,516
Cordoba	August	13,691	13,371	21	69,588	+ 2,301
East India	Sept.	2,029	1,980	8	4,092	+ 59
Kalgoorlie	July	2,796	2,552	30	18,074	— 1,948
La Plata	Sept.	4,528	4,190	39	41,852	— 3,659
Lima	August	33,939	29,800	35	271,607	+ 5,102
Lisbon Mlrs.	July	184,715	171,179	31	1,143,064	+ 45,838
Madras (14 days) Rs.	Sept. 30	24,881	24,354	38	5,17,249	+ 33,066
Manila	June	133,500	132,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	357,500	+ 7,000
Mexico —$	August	635,445	687,593	35	4,846,344	+ 384,757
Montevideo	Sept.	27,870	25,2?7	47	884,965	— 9 336
Para	August	24,485	19,354	39	189,946	— 38,540
Port Elizabeth	June	3,288	3,212	52	44,931	+ 1,901
Puebla —$	August	52,900	50,500	35	482,300	+ 17,700
Rangoon	Sep.	5 054	4,119	39	46,057	+ 421
Shanghai —$	July 29	31,163	24,600	30	720,340	+ 94,215
Singapore —$	Sept. 5	14,459	9,852	35	419,495	+ 8,314
Toronto —$	August	850,222	850,639	35	6,742,786	+ 425,112
Winnipeg —$	August	340,507	322,762	35	2.760,944	+ 111,242

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913-	Latest Return. 1914.	Latest Return. Incr. or Dec.	Aggregate. Wks.	Aggregate. 1913-4.	Aggregate. Increase or Dec.
Aberdeen Corporation	Oct. 14	£1,505	£1,452	— £53.	20	£34,497	+ £442
Accrington Corp.	,, 14	576	466	— 110	28	16,053	— 339
Ayr Corporation	,, 17	256	237	— 18	22	9,726	— 538
Bath Electric	,, 14	916	829	— 87	41	40,780	+ 190
Birkenhead Corp.	,, 18	1,292	1,202	— 90	28½	36,682	— 950
Birmingham Corp.	,, 17	12,427	11,782	— 645	29	350,671	+ 13,866
Blackburn Corporation	,, 14	1,259	1,114	— 145	29	39,623	+ 770
Blackpool Corporation	,, 15	1,036	870	— 166	29	60,872	— 9,546
Bolton Corporation	,, 18	2,854	2,464	— 390	29	81,106	+ 843
Bournemouth Corp.	,, 21	1,834	1,662	— 172	29	68,222	— 3,590
Bradford Corporation	,, 17	6,170	6,561	+ 391	29	183,054	+ 8,708
Brighton Corporation	,, 18	1,055	927	— 128	28½	34,984	— 197
Bristol	,, 16	7,893	8,029	+ 137	41½	358,188	+ 20,360
British Elec. Federatn	Sept. 18	53,760	49,637	*	...	...	...
Burnley Corporation	Oct. 17	1,737	1,282	— 455	29	46,441	— 3,848
Burton-on-Trent Corp.	,, 16	287	279	— 8	29	8,840	+ 254
Bury Corporation	,, 18	1,336	1,223	— 113	28½	41,350	+ 1,338
Cardiff Corporation	,, 10	2,688	2,575	— 113	27	79,433	+ 1,487
Chatham and District	,, 15	952	1,027	+ 75	41	39,580	+ 947
Chesterfield Corp.	,, 15	261	245	— 16	28	7,878	+ 418
Colne Corporation	,, 17	285	207	— 78	...	...	...
Cork Electric	,, 15	510	479	— 31	41	20,865	— 9
Croydon Corporation	,, 9	1,627	1,642	+ 15	27	49,025	+ 2,247
Darlington Corporation	,, 18	245	253	+ 8	29	7,604	+ 512
Derby Corporation	,, 17	971	951	— 20	28¼	29,874	+ 837
Dover Corporation	,, 17	239	275	+ 36	29	7,699	— 145
Dublin & Lucan	,, 16	123	127	+ 4	15½	2,485	— 58
Dublin United	,, 16	4,158	5,701	+ 1,543	41	244,052	+ 12,637
Dundee City	,, 14	1,292	1,197	— 95	21½	28,759	— 327
East Ham Corporation	,, 17	976	1,188	+ 212	28½	32,760	+ 4,129
Exeter Corporation	,, 16	342	331	— 11	29	10,677	+ 225
Gearless Motor 'Buses	Sept. 19	605	502	— 103	38	18,019	+ 6,575
Glasgow Corporation	Oct. 17	21,312	20,331	— 981	19	404,381	+ 5,595
Glossop (U. Elec. Supply)	,, 17	136	102	— 34	42	5,208	— 272
Halifax Corporation	,, 13	2,073	2,141	+ 68	28	64,702	+ 3,025
Hastings & District	,, 14	977	875	— 102	41	43,324	— 2,694
Huddersfield Corp.	,, 17	2,160	2,379	+ 219	29	88,647	+ 6,727
Hull Corporation	,, 17	4,419	3,789	— 630	29	90,924	— 19
Ilford U.D.C.	,, 17	439	551	+ 112	28	16,362	+ 3,187
Ilkeston Corporation	,, 21	179	115	— 64	29	3,878	— 185
Ipswich Corporation	,, 17	428	396	— 32	29	14,088	— 179
Isle of Thanet	,, 17	493	405	— 88	2	1,133	— 283
Kilmarnock Corp.	,, 17	170	148	— 22	22	3,750	— 296
Lanarkshire	,, 15	1,853	1,782	— 78	41	77,703	+ 7,737
Lancashire United	,, 14	1,647	1,543	— 104	41	68,056	+ 4,208
Leeds City	,, 17	8,813	8,016	— 297	29	241,853	+ 1,397
Leicester Corporation	,, 17	2,881	2,725	— 156	42	119,783	+ 2,723
Leith Corporation	,, 17	687	657	— 30	22	16,615	+ 203
Leyton U.D.C.	,, 15	1,300	1,328	+ 28	27	38,926	+ 1,692
Liverpool Corporation	,, 17	13,435	12,570	— 865	41½	548,428	+ 10,843
Llandudno & Colwyn B.	,, 16	213	201	— 12	46	14,666	— 2,009
London County Council	,, 14	42,858	44,401	+ 1 543	28	1,238,778	+ 52,599
London Gnl. Omnibus	Aug. 1	68,575	71,625	+ 3,050	31	1,982,031	+ 64 392
London United	Sept. 18	6,705	5,572	— 1,133	38	236,808	— 2 559
Lowestoft Corporation	Oct. 17	203	191	— 12	2	457	— 74
Maidstone Corporation	,, 8	227	217	— 10	28	6,259	+ 264
Manchester Corp.	,, 17	18,032	16,634	— 1,398	29	505,440	— 3,546
Met. Elec. Trys.	Sept. 18	9,468	8,176	— 1,292	35	345,052	+ 4,025
Nat. Steam Car Co., Ltd.	Oct. 21	3,869	4,276	+ 407	50½	219,009	+ 76,506
Nelson Corporation	,, 17	206	144	— 62	28½	5,783	— 520
N'castle-on-Tyne Corp.	,, 17	5,005	5,571	+ 566	29	156,506	+ 16,037
Newport (Mon.) Corp.	,, 10	797	778	— 19	28	23,617	+ 1,988
New St. Helens & Dist.	,, 14	797	996	+ 199	15	15,922	+ 1,275
Northampton Corp	,, 16	532	584	+ 52	28	17,214	+ 52
Nottingham Corp.	,, 15	3,411	3,230	— 181	28¼	98,651	+ 1,765
Oldham Corporation	,, 18	2,370	1,926	— 444	30	67,659	+ 948
Portsmouth Corp.	,, 17	2,198	2,101	— 97	29	78 797	...
Preston Corporation	,, 14	898	853	— 45	29	27,015	+ 994
Provincial	,, 17	1,708	2,008	+ 300	2½	5,115	+ 581
Reading Corporation	,, 15	685	667	— 18	28	20,758	+ 656
Rhondda	,, 15	1,298	1,212	— 86	41	51,197	+ 1,553
Rochdale Corporation	,, 17	1,660	1,478	— 182	29	48,565	+ 1,080
Rotherham Corp.	,, 21	1,067	1,075	+ 8	29	30,639	+ 1,396
Salford Corporation	,, 19	5,329	4,676	— 653	28	147 969	— 4,729
Sheffield Corporation	,, 18	7,727	7,541	— 186	29	229,589	+ 7,097
Southampton Corp.	,, 14	1,303	1,192	— 111	28	39,449	+ 218
Southend-on-Sea Corp.	,, 14	814	736	— 105	29	33,364	+ 2,461
South Met. Trys.	Sept. 18	1,223	1,071	— 157	38	42,045	+ 8,049
South Shields Corp.	Oct. 17	699	680	— 19	28½	22,312	+ 1,545
Sunderland Corp.	,, 19	1,423	1,291	— 132	29	44,063	+ 962
Sunderland District	,, 14	545	545	Nil	50	29.476	+ 1,256
Swindon Corporation	,, 14	166	174	+ 8	28	5,188	+ 353
Torquay	,, 15	571	440	— 131	41	24 124	— 3,476
Trys. (M.E.T.) 'Buses	Sept. 19	8,928	5,256	— 3,672	38	336,230	+ 183,768
TynesideTrys. & Tmrds	Oct. 14	492	670	+ 178	16	10,170	+ 1,716
Wallasey Corporation	,, 17	1,199	1,079	— 121	28½	38 466	+ 1,504
Walsall Corporation	,, 17	650	631	— 19	42	26.217	+ 142
Walthamstow U.D.C.	,, 17	702	712	+ 10	29	24,421	+ 2,395
Warrington Corp.	,, 1	375	416	— 41	26	11,616	— 190
West Ham Corporation	,, 15	2,641	2,728	+ 87	28	81,256	+ 3,254
Wigan Corporation	,, 16	1,575	1,437	— 138	28	41,959	— 492
Wolverhampton Corp	,, 21	1,059	960	— 99	30	31,385	— 854
Yorkshire (W. Riding)	,, 19	1,481	1,371	— 110	42	61,256	+ 231

* From such of the services as were working both last year and this year the receipts show a decrease of £4,049 upon the week.

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Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

BOROUGH OF BOOTLE.

SUPPLY OF PETROL MOTOR AMBULANCES AND VANS.

The Corporation invite tenders for the supply of two Petrol Motor Ambulances and two Bedding Vans to fit the Chassis.

A copy of the specification and form of tender may be obtained from the undersigned.

Tenders, addressed to the Chairman of the Health Committee, and endorsed "Tender for Ambulances," to be delivered at the Town Hall, Bootle, on or before Saturday, 21st November, 1914.

The Corporation do not bind themselves to accept the lowest or any tender.

By order,

J. SPENCER TUMILTY,
Town Clerk.

October 26, 1914.

CITY OF WESTMINSTER.

MOTOR WAGONS.

The Westminster City Council invite tenders for the Supply and Maintenance of one, two, four, eight, or twelve Motor Tip Wagons, to be used with Interchangeable Dust and Water Bodies. (The contractors will only be required to supply dust bodies.)

The Council are prepared to consider tenders for Petrol Wagons, Steam Wagons, Wagons conforming with the War Office subsidy requirements, and for any other types of Wagon, subject to compliance with the Council's general requirements as to dimensions, etc., stated in the tender form.

Particulars and forms of tender may be obtained on application at the City Hall, between the hours of 10 a.m. and 4 p.m. (Saturdays 10 a.m. and 12 noon).

Each tender, on the official form supplied, is to be delivered at the City Hall in a sealed cover, addressed to the Town Clerk, and marked "Tender for Motor Wagons." Tenders may be placed by or on behalf of tenderers in a locked box at the City Hall provided for the purpose. No tender will be received after 9.30 a.m. on Wednesday, November 4, 1914.

The contractor will be bound by the contract, in the case of all workmen to be employed by him, to pay wages at rates not less, and to observe hours of labour not greater, than the rates and hours recognised by the associations of employers and employees and in practice obtained in the district where the work is to be executed.

Tenderers are prohibited from directly or indirectly canvassing members or officials of the Council in reference to any tender, and the tender of any person who does so canvass will be rejected. The Council do not bind themselves to accept the lowest or any tender.

JOHN HUNT,
Town Clerk.

Westminster City Hall,
Charing Cross Road, W.C.,
October 22, 1914.

BARNET UNION.

TO HOT WATER AND ELECTRICAL ENGINEERS, MAKERS OF WATER-SOFTENING PLANTS, AND OTHERS.

The Barnet Board of Guardians are prepared to receive tenders for the following works:—

Steam Boilers and Heating and Warming Plant.
Electrical Power and Lighting Plant.
Electric Lift.
Water-softening Plant.

Plans (where applicable) and particulars may be seen, and forms of tender obtained, on application to Messrs. Williams and Cox, architects, 34, Henrietta Street, Covent Garden, W.C., any week-day (except Saturday), between 10 and 4, on payment of £2 (in notes), which will be returned on receipt of a bona-fide tender.

Sealed tenders, addressed to the Chairman of the Board, must be sent to me not later than 12 noon on Monday, December 7.

The Guardians do not bind themselves to accept the lowest or any tender.

ARTHUR WILSHIRE,
Clerk to the Guardians.

Union Offices,
1, Wellhouse Lane, Barnet,
October 28, 1914.

METROPOLITAN BOROUGH OF ISLINGTON.

PAVING WORKS.

Tenders are invited for Paving with Granite Setts and Wood Blocks the Macadamised Portions of the Carriageway of Camden Road, between Brecknock Road and Parkhurst Road, and of Parkhurst Road.

Conditions and specifications may be seen, and forms of tender and bills of quantities obtained, on and after Friday, the 30th instant, upon application to the borough engineer, Mr. J. Patten Barber, at the Town Hall, Upper Street, N., and payment of two guineas, which will be returned on receipt of a bona-fide tender and the return of the whole of the documents issued.

Sealed tenders, endorsed "Tender for Paving Works," must be received by the undersigned not later than 4 p.m. on Tuesday, the 10th November, 1914.

The Council do not bind themselves to accept the lowest or any tender.

C. G. E. FLETCHER,
Town Clerk.

Town Hall, Upper Street, N.,
October, 1914.

SOUTH INDIAN RAILWAY COMPANY, LTD.

The South Indian Railway Company, Limited, are prepared to receive tenders for the supply of:—

No. 1.—Springs, Laminated, Volute and Helical.
No. 2.—Copper Plates and Rods for Locomotive Fire-boxes.
No. 3.—Brass Boiler Tubes, 96,000 lb.
No. 4.—Steel Boiler Plates.

Specifications and forms of tender may be obtained at the Company's Offices.

Tenders, addressed to the Chairman and Directors of the South Indian Railway Co., Ltd., marked "Tender for Springs," or as the case may be, must be left with the undersigned not later than one o'clock on Wednesday, November 11, 1914.

A charge, which will not be returned, will be made of 20s. for each copy of the specifications.

Copies of the drawings may be obtained at the office of Robert White, Esq., M.Inst.C.E., Consulting Engineer to the Company, 3, Victoria Street, Westminster, S.W.

By order,

V. E. DE BROE, M.Inst.C.E.,
For Managing Director.

Company's Offices,
91, York Street, Westminster, S.W.,
October 27, 1914.

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NEWCASTLE-UPON-TYNE CORPORATION TRAMWAYS.

UNIFORM CLOTHING.

The Tramways Committee of the above Corporation invite tenders for the supply of Uniform Clothing for Inspectors, Timekeepers, Depot Clerks, Motormen, Conductors and Overhead Linesmen, etc., for the twelve months ending March 31, 1916.

Form of tender and conditions of contract can be had on application to the undersigned.

Specimen uniforms can be seen at the Tramways Offices, Manors, Newcastle-on-Tyne.

Tenders must be sent through the post, addressed to the Chairman of the Tramway Committee, endorsed "Tenders for Uniforms," and must be delivered not later that November 21, 1914.

The Tramways Committee do not bind themselves to accept the lowest or the whole of any tender.

ERNEST HATTON,
Engineer and General Manager.

Tramway Offices,
Manors, Newcastle-on-Tyne,
October 29, 1914.

COUNTY BOROUGH OF BOURNEMOUTH.

TRAMWAYS DEPARTMENT.

TENDERS FOR UNIFORM CLOTHING.

The Tramways Committee are prepared to receive tenders for the supply of Uniform Clothing for their Inspectors, Motormen and Conductors.

Forms of tender may be had on application to the undersigned at the Tramways Offices, Lansdowne Crescent, Bournemouth.

Sealed tenders, which must be made on the official form and enclosed in the printed envelope provided, to be delivered to the Town Clerk, Municipal Buildings, Bournemouth, not later than 12 o'clock noon on Wednesday, November 18, 1914.

The Committee do not bind themselves to accept the lowest or any tender.

The Contractor will be required to pay not less than the standard rate of wages current in the district where the goods are made.

I. BULFIN,
Tramways Offices, Bournemouth. General Manager.
October 30, 1914.

POSITION VACANT.

CORPORATION OF CREWE.

Wanted (during the period of the war), a Junior Charge Engineer with mechanical training and experience in a three-wire central station. Commencing salary £80 per annum. Applications, giving full particulars and when duties could be commenced, to be sent to

MANAGER,
Corporation Electricity Works, Crewe.

TRAMWAY SUPPLIES, Ltd.,

Tramway Engineers,

Sole Selling Agents for S. Dixon & Sons' Tramway Material,

160, WOODHOUSE LANE, LEEDS.

Sole Manufacturers of
TURNER'S PATENT AUTOMATIC POINT CONTROLLERS.

Telegrams: "Controllers, Leeds." Telephone: 3488 Leeds.

OVERHEAD LINE MATERIAL AND SUPPLIES.

SEND YOUR ENQUIRIES FOR

Insulating Materials,

Brass, Iron, and Copper Stampings, and General Supplies

TO

JOSEPH THOMPSON,

COLUMBIA WORKS, 106, Eyre Street, SHEFFIELD.

Telegrams: "Insulator, Sheffield."

Engineers' Specifications worked to.

Whenever you are repainting your poles ask for samples of the Kearsley ready-mixed POLE PAINTS as supplied to important Companies at home and abroad. These Paints are durable, retain their colour during exposure, and prevent rust. Information free on request.

Robert KEARSLEY & Co., Ltd.
RIPON, England.

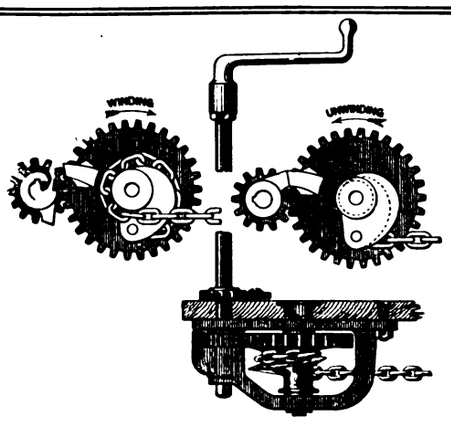
MILLARS' TIMBER AND TRADING CO., LTD.

PINNERS' HALL, GREAT WINCHESTER STREET, LONDON, E.C.,

beg to inform their Customers that the War has not interfered with their production of

JARRAH for Wood Paving,

and they are in a position to give prompt deliveries from stocks in this country.



The "Peacock" IMPROVED Brake

(PATENT).

Note the simplicity of the Radial Contact pieces which render this the quickest of all geared hand brakes by

(1) Preventing the drum from over-running on release;

(2) Stopping the drum always at the point from which recovery of chain is most rapid;

(3) Eliminating all idle turning of the handle.

THE "PEACOCK" BRAKE CO., 27, CLEMENTS LANE, LONDON, E.C.

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THE
Tramway and Railway World

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THE TRAMWAY & RAILWAY WORLD PUBLISHING CO., Ltd.,
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FOR ALL PLACES ABROAD—Thirty Shillings per Annum.

SATURDAY, OCTOBER 31, 1914.

THE "OCEAN"
ACCIDENT AND GUARANTEE CORPORATION, LTD.,
IS THE
PREMIER INSURER OF TRAMWAYS
HEAD OFFICE:
MOORGATE STREET, LONDON, E.C.

THE OBSTRUCTION OF TRAMCARS.

It is certainly peculiar that within the last week or two there seems to have been an increase in the number of cases of drivers of carts and other slow-moving vehicles obstructing the progress of tramcars. That there has been such an increase is a conclusion which can be drawn from the fact that an exceptionally large number of prosecutions for the offence are reported from various parts of the country. Yet for various reasons it might be supposed that if there was any change at all, it should have been in the opposite direction. In many districts, since the present war broke out, there has been a sensible diminution in the number of vehicles on the streets, and a reduction in the number of people wishing to use tramways has in numerous cases resulted in a falling off in tramway receipts. That must result in fewer cars being on the road. The carter accordingly has more space available than usual along the sides of the streets, and when he does bring his vehicle on to the tramway tracks, there is less chance of his causing an obstruction, seeing that there are fewer cars to obstruct. On the other hand, it has sometimes been noticed in regard to other offences of a minor nature that the number of prosecutions tend to increase in times when the police are not busily occupied with more important matters. This may be the case at present, for it appears that the stress of war has produced, among other results, a diminution in crime. If the police have less to do in looking after criminal cases, they may have more time to devote to minor offences of various kinds. In any event, it is remarkable that so many drivers of slow-moving vehicles should persist in wilfully obstructing tramcars. Evidently an odd strain in human nature comes into play. Probably the erring carter says to himself, "Why should I trouble to draw my horse and cart in to the side of the road? I have as good a right to the road as the tramcar has." He ignores the fact that it is impossible for the car to deviate laterally, and he ignores the convenience of tramway passengers. Indeed, it might be thought he had a spite against them. No doubt only a minority of carters are unreasonable; the bulk of them clear the tracks quickly enough when the car gong sounds. But in regard to the offenders, possibly something might be done if the magistrates before whom they are brought would, when imposing fines, emphasise some leading facts. There are at least three points which should be dinned into the ears of offenders. The first is that the tramway is constructed and worked under Act of Parliament, so that it has a supreme right to be where it is. Second, the statutory right carries with it the power to proceed against those who wilfully prevent the free passage of the cars. Third, great numbers of people are delayed in their journeys and inconvenienced by cars being obstructed. If these things could be fully brought home to the minds of the offenders, some improvement might follow. Other evils arising from obstruction of the cars, such as partial disorganisation of time-tables and loss of tramway revenue, would not appeal to the class of man who commits the offence, but perhaps a drilling in the first three facts mentioned might reduce trouble alike to the tramway authorities, the public, and the police.

TRAMWAYS AND THE WAR.

EDINBURGH CORPORATION.—The Government have commandeered three of the motor omnibuses running on the South Side route, so that the interval of service has had to be increased.

NEWCASTLE.—Mr. J. H. Rodgers, chairman of Newcastle Tramways Committee, has stated that from the tramways department 206 men have joined the Army and the department is paying to their wives and families about £100 per week.

GREAT GRIMSBY TRAMWAY COMPANY have had four of their Daimler motor chars-a-bancs requisitioned by the War Office. The company, however, have still sufficient vehicles to maintain the excursions to places of interest which they usually carry on.

MUSSELBURGH ELECTRIC TRAMWAY COMPANY carry members in uniform of His Majesty's Forces, navy and military, on their cars at half rate. The system now extends from Joppa to Port Seaton, so that the concession is a considerable advantage to the forces.

SHEFFIELD.—Over 5,000 people assembled at Ecclesall Church on the occasion of the funeral of Mr. Robert Ketterick, a motorman in the service of Sheffield tramways, who as a Reservist had joined his regiment and was fatally wounded at the battle of the Aisne. Nearly 200 tramway men were present at the funeral.

MUSSELBURGH CAR LIGHTS MASKED.—To aid the neighbouring military authorities, the Musselburgh tramway authorities have blinded the seaward side windows of the cars, so that no light is now sent across the waters of the Firth of Forth, along the shore of which between Joppa and Port Seaton the cars run.

GLASGOW CORPORATION TRAMWAYS staff have collected 10,000 pipes for presentation to the soldiers. Every day word is received from the camps about the difficulty of procuring pipes. Those which the Glasgow tramway men have collected from all parts of the district are being thoroughly cleaned and promptly despatched.

MANCHESTER CORPORATION.—Up to the middle of October 785 employees of the Manchester Corporation tramways department have been enrolled in the Forces. Of this total, 514 came from the traffic department and 271 from the other branches of the tramway undertaking. Included among those who have joined the ranks were 86 trolley boys.

LONDON.—It is announced that the withdrawal of omnibuses from service in London in order that they may be used for military purposes has now practically come to an end, so that no further reduction in the number may be anticipated. Though there may be a diminution in the total omnibus receipts, the revenue per omnibus running must certainly be considerably up.

BIRMINGHAM.—At the last meeting of the Birmingham Town Council, Mr. Harrison Barrow, chairman of the Tramways Committee, mentioned that the enlistment in the Army of men employed in the tramway department would cost that department at the rate of £21,000 annually. This, he said, was a pretty heavy expense, especially as the receipts were considerably less than they were at this time last year. The profits at the end of the financial year would not be large.

THE PRINCE OF WALES'S FUND.—Mr. N. J. Young, general manager of Newport Corporation tramways, makes the suggestion that quite apart from what is being done by the Municipal Officers' Guild, some distinct arrangement should be made with regard to subscriptions to be paid to the Prince of Wales's National Relief Fund, so that the whole of the Municipal Officers' Guilds through-

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out the country should make some arrangement with a view to the salaried men paying a certain percentage of their salary to the fund, and also that the general employees of the Corporation should pay a weekly sum to the fund, the amount being deducted from their weekly wages. The plan has already been followed in some towns.

Liverpool.—In Liverpool, as in some other places, the free transit allowed to Territorials and other members of His Majesty's Forces on the tramcars has been abolished. The War Office sent a letter to the Town Clerk intimating that the Western Command General Officer desired to notify that the special privilege of free travelling on the Liverpool tramway system would cease from October 16. The Army Council tendered thanks for the valuable assistance rendered during the stages of mobilisation by the generous action of the Liverpool Corporation. An agreeable interlude to the business before the Liverpool Tramways Committee was an interview which the members had with tramway drivers Edwards, Maxwell and Smicock, who had returned wounded from the war. These drivers rejoined the colours upon the outbreak of the war and saw considerable service in the field. They were in several battles and received serious wounds, but are now all recovering, and were congratulated by the Committee.

DEARNE VALLEY LIGHT RAILWAY.

The King's Bench Division of the Law Courts had before them on Monday and Tuesday a question arising out of the Dearne Valley light railway scheme. It arose on an application, *ex parte* the Great Central Railway Company, from a rule *nisi* for a writ of certiorari to the Board of Trade to bring up their order to the Light Railway Commissioners to be quashed, and for a rule *nisi* for a writ of prohibition to the Board of Trade and the Railway Commissioners to restrain them from proceeding with an inquiry, on the ground that the order was made without jurisdiction and in excess of their powers under the Act of 1896. The scheme, promoted by the four urban district councils of Wombwell, Wath-upon-Dearne, Bolton-upon-Dearne, and Thurnscoe, was for the construction of a light railway between Barnsley, Swinton, Mexborough, and Thurnscoe. The Great Central Railway Company opposed it, on the ground that it was in direct competition with them. On February 12 the company protested to the Commissioners at an inquiry held at Barnsley, and later adjourned to London; and on March 18 the Commissioners granted the application for the scheme, subject to the cutting out of certain sections of the proposed line. The four urban district councils appealed to the Board of Trade against this excision, and the Board ordered the Commissioners to hold a further inquiry, which took place on July 21 at Bolton. Its findings were provisional upon the results of the proceedings now before the Court. The point for consideration was to determine whether the Light Railway Commissioners had jurisdiction to hold the second inquiry, or to amend an order which they had already made. Mr. Justice Coleridge, in giving judgment, expressed the opinion that the Board of Trade had power to remit for re-hearing, and they were acting without their powers in so doing. The rule would therefore be discharged with costs. Mr. Justice Rowlatt and Mr. Justice Shearman concurred.

The Light Railway Commissioners have now issued their decision regarding sections 13 and 14 of the Dearne Valley scheme. These were the sections which the Board of Trade had remitted to the Commissioners for further consideration. The Commissioners state that if the promoters withdraw their application for the part of the line between Bolton-on-Dearne and Manvers Main, the Commissioners would be prepared to grant the application as to railways 13 and 14. The Commissioners are prepared to accept a cheap form of construction and a restricted outlay on road improvements, but it has been settled that further expenditure (not included in the estimates) in respect of bridges and roads will now have to be incurred; and the Commissioners remain of opinion, under all the circumstances, that both lines, from Bolton to Wath and to Mexborough respectively, should not be authorised to be constructed in the first place. Of the two lines, the evidence at the first inquiry pointed to the Mexborough route as being the more important for the public service; but after hearing the additional evidence at the second inquiry, the Commissioners are prepared to accept the substitution of the Wath route, if the Councils prefer it. It will be understood that by so doing they would not be taken to preclude, or prejudice, the addition of the Mexborough route to the system of light railways, whenever this course has been indicated by the result of working the other lines.

L.C.C. TRAMWAY MATTERS.

At the meeting of the London County Council, on Tuesday, several reports of the Highways Committee with reference to tramway matters were adopted. In view of the somewhat inaccurate statements which have been made in regard to the refusal of travelling facilities to special constables, the report on this matter is of interest.

Travelling Facilities for Special Constables.

Arrangements were made on August 17, 1914, for special constables to be carried free on the tramcars, on production of their warrant card, when going to and from their point of duty and when on duty. In consequence, however, of certain circumstances it was considered necessary to revise this arrangement, and after conference with the officer commanding the special constabulary, special passes were issued to the constables for use between their homes and the police stations to which they were attached. As this arrangement did not give satisfaction, the matter was further discussed with the police authorities, and as a result it was arranged that as from October 10, 1914, strips of 14 tickets, valid for ordinary 1d. journey stages on the tramways, should be issued to those who had to travel at least one mile from their residence or place of business to their point of duty. As a general rule these strips of tickets are equivalent to a three weeks' supply. The officer commanding the special constabulary agreed to this arrangement, and has expressed the opinion that the privilege of free travelling should be withdrawn if it is in any way abused. So far as the Highways Committee is aware, the Council is the only transit authority in London which grants free travelling facilities to special constables.

Provision of Reactance Coils and Steel Valve Chests.

The Highways Committee reported that on October 14, 1913, they had accepted the offer of the British Westinghouse Electric and Manufacturing Company, Ltd., to supply for the sum of £5,943, thirteen reactance coils and two steel valve chests required in connection with the provision of protective devices, etc., for the plant at the Greenwich generating station. The contract entered into with the company provides for payment of 90 per cent. of the contract price to be made when the work is taken over and the balance of 10 per cent. to be paid at the expiration of the maintenance period of twelve months. All the reactance coils and steel valve chests have been delivered and erected and some of them can be taken over, but the remainder cannot be taken over at the moment. As a consequence, the company has received no payment in respect of the work. The Highways Committee now recommended that the company should be paid 90 per cent. of the value of such part of the work as can now be taken over, and 75 per cent. of the value of the work delivered and erected. The total payment under this arrangement will amount to about £4,400.

Inspector of Rails, etc.

The Highways Committee recommend that the rate of pay of temporary inspectors in the chief engineer's department engaged in the supervision of the manufacture of rails and special trackwork, etc., for the Council's tramways be from £3 3s. to £5 5s. a week.

Supply of General Stores.

The Stores and Contracts Committee recommended that the Committee be authorised to open the tenders to be received for the supply of the goods included in the general stores schedules, 1915. The current contracts for the supply of general stores will, with a few exceptions, expire on December 31, 1914, and the Committee are taking steps with a view to obtaining supplies during the year 1915. This group of contracts, which ordinarily comprises upwards of 40 schedules, is the largest of the several groups dealt with each year, and generally includes all such goods as metals and metal goods, electric cables, lamps, fittings and materials, petrol, oilman's sundries, glass, horticultural goods, rubber goods, chaff and fodder, soap, leather, baskets, mats, etc., etc. Owing to the special circumstances which have arisen in consequence of the war, it is proposed in some cases to purchase goods during 1915 at the current market rates or under special quotations, until trade conditions again become normal or until it is considered that the time is favourable for new contracts to be entered into. In all other cases, however, new forms of tender and schedules have been prepared and will be issued shortly. The tenders will be received early in November, 1914, and, as the number of tenders received will probably be large, the Committee considered it desirable, as in previous years, for the tenders to be opened by them instead of in the Council.—The report was adopted.

Special Fares for Children.

Mr. C. Jesson (Walworth) asked if reduced fares could be granted to children in congested areas, in order that they might be able to reach the parks and open spaces at a distance, seeing that to their maintenance all ratepayers contributed alike.

Mr G. H. Hume (Chairman of the Highways Committee) replied that on July 29 the Council decided to reduce fares to children under 14 years of age on Saturdays and Sundays, viz., ½d. for 1d. stages, 1d. for 1½d. and 2d., and 1½d. for 2½d. and 3d. fares. These would come into operation on November 7, with the result that a child could travel from, say, Camberwell Gate to Brockwell Park for 1½d. (Hear, hear.)

Opposition to London Extensions.—The City of London Corporation have decided to oppose the following tramway extensions in the City which are being put forward by London County Council—namely, (1) from Aldgate terminus to Aldgate station; (2) Aldgate terminus to Mark Lane station *via* Mansel Street; (3) from Charles Street to Blackfriars *via* Farringdon Street and Ludgate Circus; and (4) from Gray's Inn Road *via* Holborn and Charterhouse Street to Farringdon Street. The Lambeth Borough Council have also agreed to oppose the scheme of the County Council to construct a tramway in the New Cut, on the south side of the Thames.

Edinburgh Tramways.—At a meeting of the Tramway Committee last week the engineer, in reporting on the upkeep and maintenance of the tramway system, said that up to the present time approximately half the length of the system had been renewed or partially repaired, and the expenditure for the past six years had averaged £18,000. The report also dealt with the cost of maintaining the cars and rolling stock, which was considered satisfactory. The committee decided to recommend the Town Council to include in the application for a provisional order a proposal for the extension of the tramway to Corstophine village and the linking up of two routes.

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MISCELLANEOUS NEWS AND NOTES.

Track Renewal at Bolton.—The Tramways Committee propose to re-lay the track in Great Moor Street.

The Electric Light Committee of the Edinburgh Town Council are considering the purchase of an electric motor car and an electric motor lorry.

Motor Omnibuses at Rotherham.—The tramway engineer has been asked to prepare a report as to the advisability of running motor omnibuses to Conisbro.

Preston Corporation have received the sanction of the Board of Trade to borrow £7,000 for car shed and office extension, and £5,049 for six additional cars.

West Ham Tramways Committee have recommended that application should be made for sanction for the laying of double lines in portions of Woodgrange Road.

Proposed Extension at Aberdare.—The Urban District Council propose to seek Parliamentary powers for the extensions of the tramways and a new railless traction route.

Colwyn Bay Extension.—The Llandudno and Colwyn Bay Electric Railway Company, Limited, are about to commence the extension of the line from Colwyn Bay to the Queen's Hotel, Old Colwyn.

Buenos Ayres Tramways.—According to the *Review of the River Plate*, the Anglo-Argentine Tramways Company has received the approval of the Government to the combination of the passenger services on its lines and those of the Buenos Ayres-Quilmes Company.

The Institution of Civil Engineers.—The inaugural meeting of the session of 1914-15 will be held on November 3, at 8 p.m., when Mr. B. Hall Blyth, M.A., will deliver the presidential address. This will be followed by the presentation of medals awarded by the Council.

Walthamstow Extensions.—Mr. G. R. Spurr has recommended to the Public Lighting Committee that application be made for sanction to borrow £14,590, including £3,610 for a 600 kw. set, £7,350 for a 1,500 kw. turbo-alternator, £3,035 for a 1,000 kw. rotary converter and £595 for low-tension cable, switchgear, etc.

Halifax Tramway Bill.—The Parliamentary Committee have decided that if a Parliamentary Bill be promoted in the next session of Parliament, powers for the construction of a tramway to Allend via Woodside shall be included. It is proposed that the fare from Halifax Post Office to Allend should be 2d.

Northampton Tramways Extension.—The extension of the Northampton tramways to Far Cotton was opened on October 23. Owing to a level crossing the car from the centre of the town only runs as far as the railway lines. Passengers have to alight and to board a car on the other side of the crossing which takes them to the terminus.

Huddersfield Extension to Brighouse.—The Huddersfield and the Brighouse Corporations, after long negotiations, have reached an agreement whereby Huddersfield Corporation will extend their tramway system to Brighouse. The former will seek powers in the forthcoming session to extend the tramways in order to carry out the arrangement.

Mexico Tramways.—The London office of the Mexico Tramways Company have received information that the strike of the company's employees has been suppressed. The Government continue to control the operation of the company's property, but the whole of the daily earnings of the tramways are being paid regularly into the company's account at the bank.

Proposed Stalybridge Extensions.—The Stalybridge, Hyde, Mossley and Dunkinfield Tramways and Electricity Board have decided to apply in the next session of Parliament for an Act to enable them to construct and work additional tramways, to run motor omnibuses, to purchase tramways now belonging to the Oldham, Ashton and Hyde Tramways Company and to the Hyde Corporation, and to construct an additional generating station.

London Omnibus Service.—Beginning with this week, the London General Omnibus Company have taken off many of their late omnibuses, so that the service ceases to run at an earlier hour than hitherto. As there are comparatively few evening performances at the theatres, as the illumination of the streets has been lessened, and as licensed houses are closed at an earlier hour, there is a comparatively early cessation of passenger traffic.

Wages at Huddersfield.—A deputation from the Tramwaymen's Union recently waited upon the Sub-Committee of the Huddersfield Tramways Committee with reference to the time fixed for the maximum wages of motormen. The committee, after consideration, resolved that the question of wages be left to the manager to deal with. It had previously been arranged that the conductors were to receive certain advances, and it was now agreed that these should come into force on October 1.

A Car Driver Killed.—A fatality of a very unusual kind is reported from Kidderminster. William Waile, an experienced driver, fell from a car platform while the car was passing out of a loop, and was run over by the car. The coroner's jury, who heard the evidence in the matter last Saturday, returned a verdict of accidental death. The Coroner said that it seemed probable that as the car was passing out of the loop the driver turned round to look down the car and lost his balance.

The Brighton and Hove Disagreement.—The General Purposes Committee of Brighton Corporation recommended that body at its meeting on Thursday last to inform Hove Town Council that they are unable to adopt the over-running system of railless traction for the purpose of the Brighton through routes, and that unless the Hove Corporation agree to adopt the under-running system for the through routes application will be made to the Board of Trade to appoint an arbitrator to determine the question. The proposal gave rise to a long discussion, and an amendment was moved to defer consideration till the second meeting of the Corporation in November. Ultimately, the amendment was rejected by 31 votes to 19, and the Committee's recommendation was adopted. It should be mentioned that prior to the date of the meeting Brighton Corporation had been advised by Mr. J. B. Hamilton, general manager of Leeds tramways, in favour of the under-running system, while Hove had a report from Mr. Stephen Sellors, consulting engineer, in favour of the over-running method.

Penalties for Tramcar Obstruction.—John Brown was found guilty of impeding the traffic on the Croydon tramways on October 8. The driver of a tramcar, in giving evidence against him, said that there were four vans on the road and three of the drivers pulled off, but the defendant remained on the road for 400 yards, although there was plenty of room for the defendant to get off the track. Other witnesses corroborated the statement, and the Bench considered the case one of gross obstruction and fined the defendant 22s. 6d. and costs.—Another recent case was the conviction of John Walton, of Newton, who was summoned at Leicester for not driving a wagon as near to the pavement as possible and thus infringing the traffic regulations. The defendant admitted the charge, but a police constable said that the defendant was abusive when told that he was obstructing a tramcar. The defendant said that he was acting in his master's interests. If he had pulled to the side he would have lost a quantity of clover. The magistrate fined the defendant 20s., and said that if his statement was correct no doubt his master would pay the fine.—At York, on October 21, Charles Dixon, licensed cab driver, was summoned for wilfully impeding a tramcar in Queen Street on October 1. The town clerk said that the driver of the car sounded his gong, but the defendant persisted in keeping on the track. Such conduct might prove a very serious interference to the proper running of the tram service. The motorman of the car, in confirming the clerk's statement, said that the defendant was driving a cab, but paid no attention to the ringing of the gong. The defendant could have allowed the car to pass on several occasions, but all the way he kept his cab three parts on the track. Other witnesses confirmed the statement, but the Lord Mayor said the magistrates did not think the evidence sufficient to show that there was room to pass, and on that ground they dismissed the case. They warned the defendant, however, and reminded him that it was a "near go."

CONTRACTS AND ORDERS.

The British Thomson-Houston Company, Ltd., of Rugby, have an order for a 2,000-k.w. turbo-alternator with condensing plant, at £6,718, from Barrow-in-Furness.

Glasgow Electricity Committee has accepted the tender of Babcock and Wilcox for the supply and erection of a coal conveyor at £22,234 at the new Dalmarnock works.

The Underfeed Stoker Company have recently supplied stokers to Bristol Corporation electricity works, the South Metropolitan Light and Power Company, and the Central Electric Supply Company, of St. John's Wood.

Salford Tramways Committee have accepted the following tenders:—Bayliss, Jones and Bayliss, Ltd., 2,000 single-ended tie-bars, £11 12s. 6d. per ton, 2,500 double-ended tie-bars, £12 per ton—plus 3s. per ton for cartage in both cases; Hadfields, Ltd., 24 manganese-steel points and 12 manganese-steel crossings, £528; Titan Trackwork Co., Ltd., eight manganese-steel points and four manganese-steel crossings, £173; and Walter Scott, Ltd., 500 tons Sandberg steel tramway rails, £7 15s. per ton, plus 2s. per ton for cartage.

PERSONAL.

Resignation of Mr. J. Gottschalk.—A special meeting of Northampton Town Council was held on Monday for the purpose of considering further the position of Mr. J. Gottschalk, the tramway manager. Mr. Gottschalk, it will be remembered, is of German birth, but has been for many years in this country, and has for a long time been manager of Northampton tramways, where he has earned the confidence and esteem of the Council and of the public generally. After the outbreak of the war an agitation was raised against his being continued in the managership, and he placed himself unreservedly in the hands of the Tramways Committee. That Committee emphatically affirmed its confidence in him, and its action was supported by the Corporation. The agitation, however, went on, and those moving in it threatened to contest a number of wards at the municipal election on the subject. It had previously been agreed that in consequence of the war it was desirable that there should be no municipal contests. In the light of the threat of elections having to be fought, the Tramways Committee turned again to the subject, and at a meeting on Wednesday last week a letter was received from Mr. Gottschalk asking to be relieved of his duties for the period of the war. The Committee received the letter with regret, and agreed to relieve Mr. Gottschalk of his duties from October 25, and decided to pay him one-third of his former salary. This proposal came before the meeting of the Corporation on Monday, when a great deal of discussion took place and considerable variety of opinion was expressed. It was ultimately agreed that in view of Mr. Gottschalk's letter his resignation should be accepted, that £300 should be paid to him as compensation, that temporary arrangements be made for the management of the tramways, and that no permanent appointment be made without special direction by the Council.

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FINANCIAL REPORTS AND MEETINGS.

Callender's Cable and Construction Company.—The usual interim dividend on the ordinary shares at the rate of 10 per cent. per annum will be paid on November 2.

City of Buenos Ayres Tramways.—The directors have declared a dividend of 1s. 3d. per share, being at the rate of 5 per cent. per annum, less tax, for the quarter ended September 30.

New St. Helens and District Tramways.—The board recommend a dividend of 2½ per cent. on the preference shares, the placing of £2,000 to reserve, and the carrying forward of £3,387.

Halifax Tramways.—A revenue statement for the six months ended September 30 last has been issued. It shows that the receipts amounted to £61,305, being an increase of £3,158 compared with the corresponding half of the previous year. The expenses came to £52,694, being an increase of £2,988.

Lima Light, Power and Tramways Company.—A general meeting of the holders of the first mortgage debentures will be held on November 18, for the purpose of passing an extraordinary resolution assenting to the modification of the rights of the debenture holders. It is proposed that the redemption of debentures should be postponed until the expiration of one year after peace has been declared by all the Powers involved in the present war. No dividends are to be paid until after payments have been renewed.

Huddersfield Tramways.—The financial statement for the six months ended September 30 shows that the income from the Corporation tramways had been £64,784, compared with £59,606 for the corresponding period of last year, and the total working expenditure was £34,371, against £32,443. There was a surplus of £10,677, compared with £8,792. The transfer to the reserve or renewals account for the six months was £6,883 3s. 4d., and the fund stands at £22,210 12s. 7d., compared with a balance brought forward of £30,973 13s. 8d.

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 57 of the principal undertakings of the United Kingdom for the week ended October 24 give total receipts of £210,831, or £1,814 less than in the corresponding week last year. The total length of track was 2,630 miles, or 24 more than for the corresponding week. Receipts were at the rate of £80 3s. 3d. per track mile, a decrease of £1 8s. 8d. as compared with the corresponding week of last year.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1913-5.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Angio-Argentine	Oct. 21	£57,311	£49,213	42	£2,273,953	— £48,448
Auckland (28 days)	Aug. 28	19,543	21,046	8½	44,357	+ 2,747
Ballarat and Bendigo	Aug. 16	3,156	3,055	20	17,382	— 248
Brazilian St. Ely. Mlrs.	May	44,920	50,227	43	523,572	+ 76,626
Brazilian Traction	August	418,837	347,645	35	3,196,533	— 14,168
Brisbane	August	29,970	33,172	35	231,327	+ 24,649
British Columbia $	August	770,628	674,512	9	1,364,885	— 161,736
Buenos Aires Pt. & City	June	6,791	6,733	26	43,250	+ 3,148
Buenos Aires Lacrose	July	45,221	45,327	4	43,727	— 1,894
Calcutta Rs.	Oct. 24	59,024	55,488	42	28,42,557	+ 70,441
Cape Town	June	11,560	12,742	52	155,466	+ 18,149
Carthagena & Herrerias	Sept.	1,844	2,175	39	21,145	— 3,516
Cordoba	August	13,691	13,871	21	69,583	+ 2,201
East India	Sept.	2,028	1,980	8	4,092	+ 59
Kalgoorlie	August	3,257	3,042	34	21,116	— 2,268
La Plata	Sept.	4,528	4,190	39	41,852	— 3,659
Lima	August	33,939	29,800	35	271,607	+ 5,102
Lisbon Mlrs.	July	164,715	171,179	31	1,148,064	+ 45,838
Madras (14 days) Rs.	Oct. 15	26,161	24,042	41	5,41,291	+ 20,947
Manila	June	133,500	132,500	26	333,559	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	387,500	+ 7,000
Mexico $	August	635,445	687,593	35	4,846,344	+ 834,757
Montevideo	Sept.	27,870	25,327	47	334,965	— 9,336
Para	August	24,455	19,354	39	189,946	— 36,540
Port Elizabeth	June	3,268	3,212	52	44,981	+ 1,901
Puebla $	Sept.	51,100	52 200	39	534,500	+ 18,800
Rangoon	Sep'.	5,054	4,119	39	46,087	+ 421
Shanghai $	July 29	31,163	24,600	30	720,340	+ 94,215
Singapore $	Sept. 19	12,439	9,651	37	438,980	— 13,479
Toronto $	August	850,222	850,639	35	6,748,786	+ 425,112
Winnipeg $	August	340,507	322,762	35	2,760,944	+ 111,242

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1915-	Latest Return. 1914.	Latest Return. Incr. or Dec.	Aggregate. Wks.	Aggregate. 1913-4.	Increase or Dec.
Aberdeen Corporation	Oct. 21	£1,453	£1,465	+ £12	21	£35,962	+ £453
Accrington Corp.	,, 21	607	454	— 153	29	16,507	— 491
Ayr Corporation	,, 24	254	232	— 22	23	10,159	— 360
Bath Electric	,, 21	969	763	— 206	42	41,543	+ 185
Birkenhead Corp.	,, 25	1,187	1,178	— 9	29½	38,060	— 959
Birmingham Corp.	,, 24	12,388	11,780	— 608	30	362,453	+ 13,258
Blackburn Corporation	,, 21	1,457	1,122	— 335	30	40,745	+ 500
Blackpool Corporation	,, 22	941	710	— 231	30	61,083	— 9,833
Bolton Corporation	,, 25	2,606	2,341	— 265	30	83,447	+ 577
Bournemouth Corp.	,, 28	1,785	1,615	— 170	30	64,888	— 3,759
Bradford Corporation	,, 24	5,974	5,817	— 157	30	188,871	+ 8,551
Brighton Corporation	,, 25	946	916	— 30	29½	33,909	— 226
Bristol	,, 23	7,458	7,691	+ 233	42½	365,869	+ 20,614
British Elec. Federatn.	Sept. 18	53,780	49,687	*	...	...	...
Burnley Corporation	Oct. 24	1,676	1,328	— 348	30	47,760	— 4,196
Burton-on-Trent Corp.	,, 25	272	284	+ 12	30	9,124	+ 266
Bury Corporation	,, 25	1,324	1,151	— 173	29½	43,501	+ 1,164
Cardiff Corporation	,, 10	2,698	2,575	— 113	27	79,433	+ 1,457
Chatham and District	,, 22	941	999	+ 58	42	40,579	+ 1,005
Chesterfield Corp.	,, 22	256	244	— 12	29	8,122	+ 406
Colne Corporation	,, 24	270	194	— 76	...	...	...
Cork Electric	,, 22	479	480	+ 1	42	21,346	— 8
Croydon Corporation	,, 16	1,616	1,565	— 51	28	50,590	+ 2,125
Darlington Corporation	,, 24	245	247	+ 2	30	8,051	+ 514
Derby Corporation	,, 24	963	951	— 12	29½	36,825	+ 825
Dover Corporation	,, 24	269	248	— 21	30	7,948	— 124
Dublin & Lucan	,, 23	110	129	+ 19	16½	2,615	— 38
Dublin United	,, 23	4,329	5,763	+ 1,434	42	249,615	+ 14,043
Dundee City	,, 21	1,278	1,226	— 52	22½	29,985	— 380
East Ham Corporation	,, 24	957	1,194	+ 237	29½	38,963	+ 4,364
Exeter Corporation	,, 25	336	332	— 4	30	11,009	+ 231
Gearless Motor 'Buses	Sept. 19	605	502	— 103	33	18,019	+ 6,575
Glasgow Corporation	Oct. 24	21,041	20,411	— 630	30	434,763	+ 4,863
Glossop (U. Elec. Supply)	,, 24	136	100	— 36	42	5,309	— 226
Halifax Corporation	,, 20	2,219	2,083	— 136	29	66,798	+ 2,889
Hastings & District	,, 21	936	856	— 80	42	44,180	+ 2,774
Huddersfield Corp.	,, 24	2,114	2,335	+ 221	30	90,982	+ 6,949
Hull Corporation	,, 24	3,159	2,912	— 247	30	98,857	+ 266
Ilford U.D.C.	,, 24	441	564	+ 123	30	16,927	+ 3,510
Ilkeston Corporation	,, 26	123	150	+ 27	30	4,023	— 158
Ipswich Corporation	,, 24	432	397	— 35	30	14,431	— 183
Isle of Thanet	,, 26	408	372	— 36	3	1,505	+ 269
Kilmarnock Corp.	,, 24	174	145	— 29	28	3,895	— 325
Lanarkshire	,, 22	2,057	1,931	— 126	42	79,634	+ 7,612
Lancashire United	,, 21	1,698	1,536	— 172	42	69,569	+ 4,083
Leeds City	,, 24	8,169	7,895	— 274	30	242,749	— 1,004
Leicester Corporation	,, 24	2,857	2,706	— 151	42	122,460	+ 2,569
Leith Corporation	,, 24	674	675	+ 1	23	17,399	+ 204
Leyton U.D.C.	,, 15	1,300	1,398	+ 98	27	38,926	+ 1,698
Liverpool Corporation	,, 24	12,742	12,812	+ 70	42½	551,339	+ 10,912
Llandudno & Colwyn B.	,, 28	196	177	— 19	27	18,848	— 2,028
London County Council	,, 21	43,378	46,246	+ 2,868	29	1,286,024	+ 54,457
London Gnl. Omnibus	Aug. 1	68,575	71,625	+ 3,050	31	1,982,031	+ 64,398
London United	Sept. 19	6,705	5,572	— 1,133	33	236,808	— 2,559
Lowestoft Corporation	Oct. 24	197	183	— 14	3	640	— 89
Maidstone Corporation	,, 22	215	198	— 17	30	6,639	+ 228
Manchester Corp.	,, 24	17,673	16,448	— 1,225	30	521,898	— 4,885
Met. Elec. Trys.	Sept. 18	9,468	8,176	— 1,292	35	345,052	+ 4,025
Nat. Steam Car Co., Ld.	Oct. 21	3,869	4,276	+ 407	50½	219,009	+ 76,506
Nelson Corporation	,, 24	206	133	— 73	29½	5,866	— 598
N'castle-on-Tyne Corp.	,, 24	5,441	5,692	+ 251	30	163,198	+ 16,288
Newport (Mon.) Corp.	,, 31	754	763	+ 9	30	25,129	+ 1,966
New St. Helens & Dist.	,, 21	799	989	+ 190	16	16,912	+ 1,464
Northampton Corp	,, 23	551	563	+ 12	29	17,776	+ 64
Nottingham Corp.	,, 22	3,314	3,242	— 72	29½	101,893	+ 1,693
Oldham Corporation	,, 25	2,196	1,883	— 313	31	69,541	+ 625
Portsmouth Corp.	,, 24	2,085	2,095	+ 10	30	75,893	...
Preston Corporation	,, 21	859	838	+ 21	30	27,853	+ 974
Provincial	,, 24	1,741	2,066	+ 325	3½	7,180	+ 878
Reading Corporation	,, 22	704	650	— 54	29	21,408	+ 612
Rhondda	,, 22	1,409	1,183	— 226	42	53,321	+ 1,427
Rochdale Corporation	,, 24	1,625	1,439	— 186	30	50,005	+ 804
Rotherham Corp.	,, 28	1,006	952	— 54	30	31,592	+ 1,343
Salford Corporation	,, 26	5,064	4,556	— 508	29	152,524	— 5,251
Sheffield Corporation	,, 25	7,458	7,473	+ 15	30½	237,012	+ 6,905
Southampton Corp.	,, 21	1,261	1,148	— 113	29	40,597	+ 105
Southend-on-Sea Corp.	,, 21	791	737	— 54	30	34,101	+ 2,407
South Met. Trys.	Sept. 18	1,229	1,071	— 157	28	42,045	+ 8,049
South Shields Corp.	Oct. 24	668	659	— 9	29½	23,471	+ 1,536
Sunderland Corp.	,, 25	1,327	1,334	+ 7	30	45,388	+ 970
Sunderland District	,, 21	548	538	— 10	51	30,014	+ 1,245
Swindon Corporation	,, 21	169	171	+ 2	29	5,359	+ 360
Torquay	,, 22	490	440	— 50	42	24,564	— 3,537
Trys. (M.E.T.) 'Buses	Sept. 19	8,928	5,256	— 3,672	38	336,230	+ 163,768
TynesideTrys. & Tmrds	Oct. 21	717	654	— 63	17	10,628	+ 1,658
Wallasey Corporation	,, 24	1,184	1,068	— 46	29½	39,564	+ 1,458
Walsall Corporation	,, 24	623	631	+ 8	43	26,848	+ 150
Walthamstow U.D.C.	,, 24	712	723	+ 11	30	25,156	+ 2,429
Warrington Corp.	,, 1	375	416	— 41	26	11,616	— 190
West Ham Corporation	,, 22	2,713	2,698	— 15	29	83,954	+ 3,239
Wigan Corporation	,, 22	1,617	1,375	— 242	29	48,339	— 735
Wolverhampton Corp	,, 23	1,038	985	— 53	31	32,359	— 906
Yorkshire (W. Riding)	,, 25	1,347	1,322	— 25	43	69,578	+ 206

* From such of the services as were working both last year and this year the receipts show a decrease of £4,089 upon the week.

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THE Tramway & Railway World
WITH MOTOR TRAFFIC SECTION

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THE "CEDES" TRACKLESS TROLLEY SYSTEM AT HOVE.

For over a year the Hove Corporation have been seriously considering the merits of railless traction with a view to the installation of a complete system of transit within the borough and, if possible, of affording means of intercommunication with their neighbours. To assist the members of the Town Council and their officers in the selection of suitable means for carrying out their plans, the "Cedes" Electric Traction Company have erected about a mile of line at Hove on their trackless trolley system with over-running trolley. This demonstration line extends from Church Road through George Street and Goldstone Villas to Hove Railway Station and back to Church Road; and upon this route the double-deck omnibus shown in one of the accompanying illustrations has been successfully running for the past two months. As will be seen from the plans of the route the installation is of a comprehensive character, and includes overhead special work which the company claim will overcome all the difficulties likely to be met with in an extensive system where a frequent service would be maintained and interrunning with tramways is contemplated.

Church Road, where the present demonstration line begins and ends, is the main road running east to west from Brighton to Portslade and thence to Worthing. George Street is the shopping street of Hove, and is the narrowest on the route. Goldstone Avenue is a residential road of fair width leading up to the Hove Railway Station. A good idea of the general lay-out of the whole system will be gathered from the plans which are reproduced herewith, and embrace each of the sections where special work is installed, merely leaving out portions of the straight line in Goldstone Villas and George Street.

Circular Terminal Loop of Trackless Trolley Line at Hove Railway Station.

Owing to the fact that the roads in the borough of Hove are much wider than those upon which the "Cedes" system is operating in other parts of the country and to the heavy service of trolley vehicles that is contemplated, it was decided to erect a line on each side of the roadway with poles carrying single-arm brackets. For æsthetic reasons the Hove Corporation strongly objected to the span-wire system, and one of their reasons for favouring the trackless system is that the overhead construction is less conspicuous.

The length of single arm adopted in Goldstone Villas is 9 ft. 6 in. in length, the distance from

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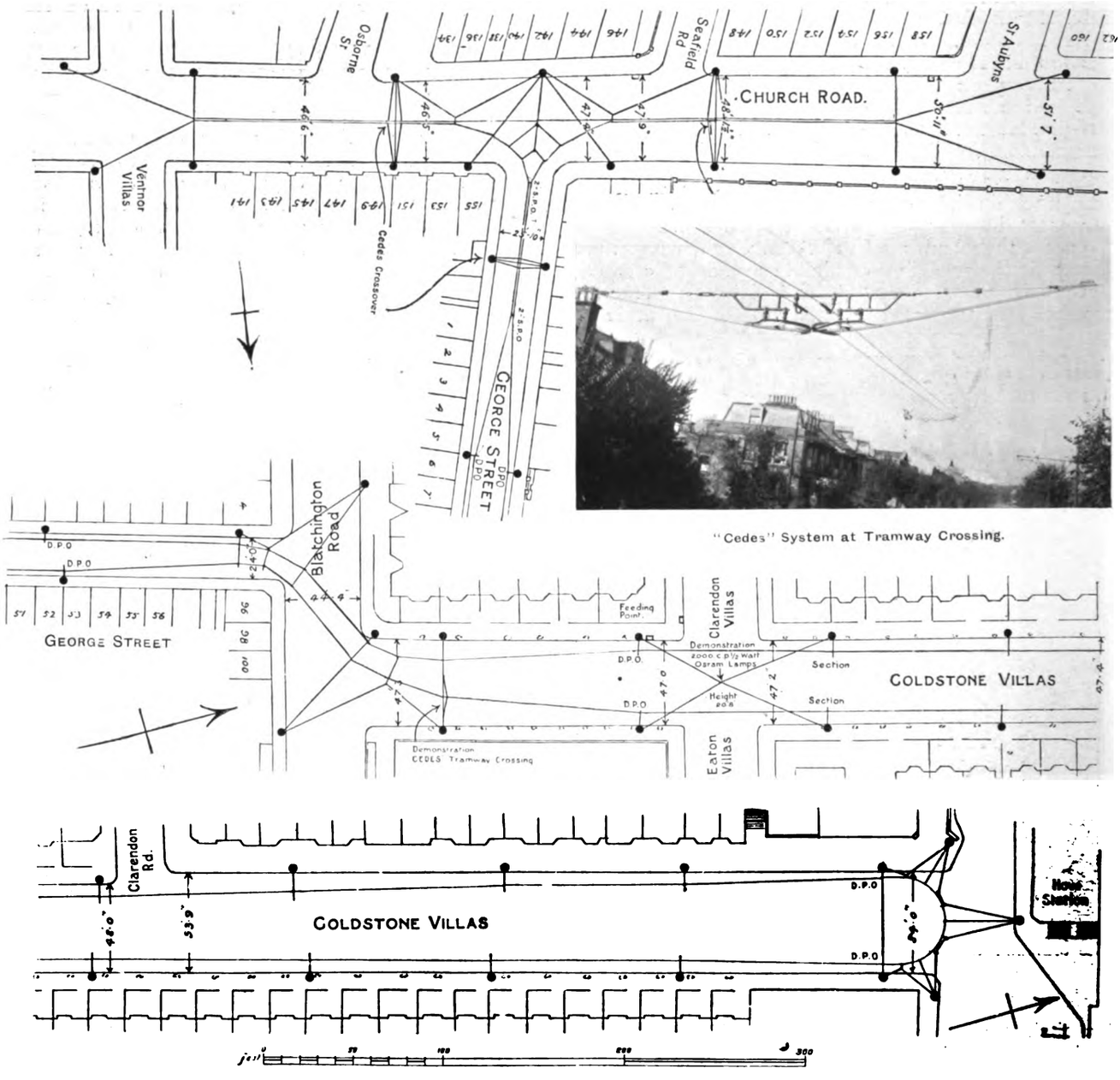
the edge of the kerb to the nearest trolley wire being fixed at 6 ft. Although the "Cedes" system allows a shorter length of bracket arm to be employed, for instance, of the type used in the George Street section of the line, a longer arm was necessary in Goldstone Villas, in order to avoid undue lopping of the trees. The maximum width of the roadway on this section of the route is 54 ft., and the type of construction adopted clearly demonstrates the flexibility of the "Cedes" system.

In order to demonstrate the method adopted by the "Cedes" Company in crossing a tramway trolley line with their current collector, a "Cedes" tramway crossing was the tramway trolley wire crossing. The tramway trolley wheel when crossing this gap runs on the wheel flanges. It will also be observed that the strain of the tramway trolley wire through the framework of the crossing is taken in a direct line, thereby reducing the weight of the crossing to a minimum. The two steel bows, one on each side of the gap in the tramway line, are for the purpose of guarding the "Cedes" current collector pendulum when passing through the crossing, which enables the trolley 'bus to be operated from a considerable distance beneath.

The well-known type of "Cedes" current collector is



"Cedes" System at Tramway Crossing.

Plans Showing Arrangement of Parts of Overhead Line—"Cedes" System at Hove.

erected in Goldstone Villas of the design illustrated above. This crossing is similar to that erected upon the "Cedes" system of the Keighley Corporation, which has now been in operation for some months, and also to that erected on the "Cedes" system in Paris. Slight departures, however, have been made in the design. It will be seen from the illustrations that the two "Cedes" trolley wires have the advantage of an uninterrupted path, and that the pendulum of the current collector passes through a gap having a width of $\frac{1}{8}$ in. in employed. The weight of this collector, including the connecting cable and the disconnecting socket, is 28 lb. This weight is distributed over the four trolley wheels, giving a weight of 7 lb. only on each wheel. It is principally due to this distribution of weight that the maintenance of "Cedes" overhead lines is practically negligible. A measurement was recently taken to ascertain the wear on the trolley wire on the Keighley system, after it had been in operation for 18 months, and it was found that the wear was infinitesimal. If

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"Cedes" System in Goldstone Villas, Hove.

required, the trolley permits the vehicle to run 35 ft. away from the overhead wires, so that in practice there is no difficulty in passing vehicles, or avoiding bad portions of the roadway.

At the junction of Church Road with George Street, three "Cedes" cross-overs have been erected, one in George Street and two in Church Road; and these will enable trolley omnibuses to operate in all directions, viz., east and west in Church Road, and from George Street going east or west in Church Road in both directions. To permit the current collector to be operated in any one of the four directions required, two steel blades are employed, which are pivoted in the centre of the cross-over. The blades are set

"Cedes" System in Goldstone Villas, Lighted by 2,000-c.p. Half-Watt Osram Lamp.

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automatically for one of the four roads by means of a spiral spring anchored from the end of the blade to a pole on each side of the roadway.

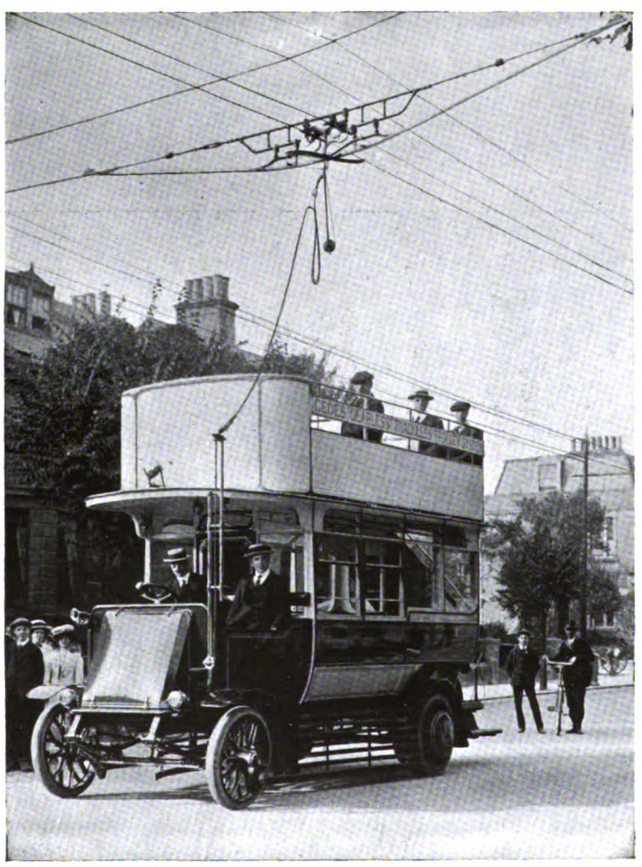
Reference to the plans will give a clear idea of the system of suspension, together with the method of working. The whole system has been designed upon the double-line principle, the wires being placed at the side of the road, except at the Church Road end of George Street, where both lines converge to the cross-over, the line being there set for either east or west. At the station end of Goldstone Villas the line is carried round in the form of a semi-circle. The method of anchoring is shown on the plan, while the general appearance of the work is shown in an accompanying view.

Side-Pole Construction for "Cedes" System in George Street.

On the middle section of the plan at the junction of Eaton Villas and Clarendon Villas with Goldstone Villas is shown the position of the demonstration lamp which is the subject of an interesting experiment that the Hove Corporation are making with a view to improving the street lighting of the borough. The lamp is one of the new ½-watt 2,000-c.p. Osram lamps now manufactured by the General Electric Company, and is taking the place of six gas lamps. Our illustration is from a photograph taken at midnight.

The double-deck omnibus which is being used for the demonstration at Hove is similar to the Allen type so popular in London. It is a handsome vehicle of registered design, and embraces a number of special features which afford the acme of comfort for the passengers and at the same time considerably reduce the weight of the vehicle. There is seating accommodation for 33 passengers, 16 inside and 17 outside, half the inside seats facing the driver. Messrs. Christopher Dodson, of London, were the body builders, and the design is the outcome of their many years' experience in omnibus body work. The total weight of the vehicle, including the 33 passengers, is 5 tons 10 cwts., which we believe compares most favourably with any other type of passenger vehicle of similar carrying capacity yet constructed.

The outstanding feature of the "Cedes" chassis is, of course, the patent motor wheel; this dispenses entirely with all gearing, as the drive is direct; it is also claimed for the system that while it will run with the smallest amount of attention, replacements when necessary can be made in a very short space of time. The current consumption per mile for the omnibus when fully loaded during its running at Hove has been ·65 of a unit.



"Cedes" Omnibus Passing Tramway Cross-Over.

"Cedes" Flexible Suspension from Side Pole.

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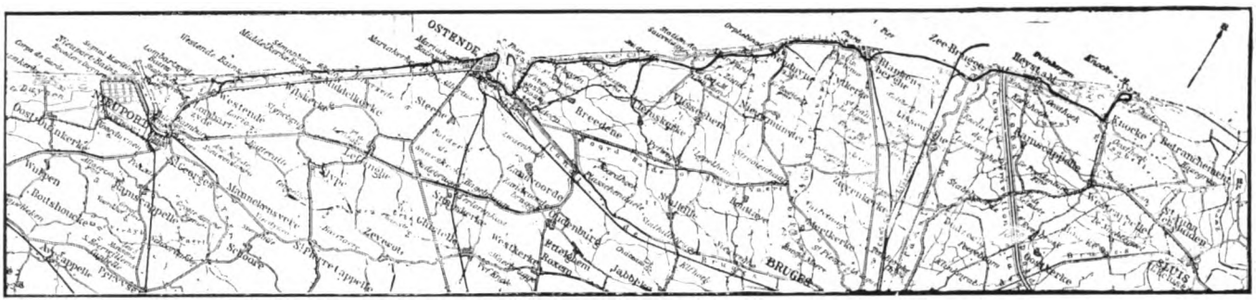
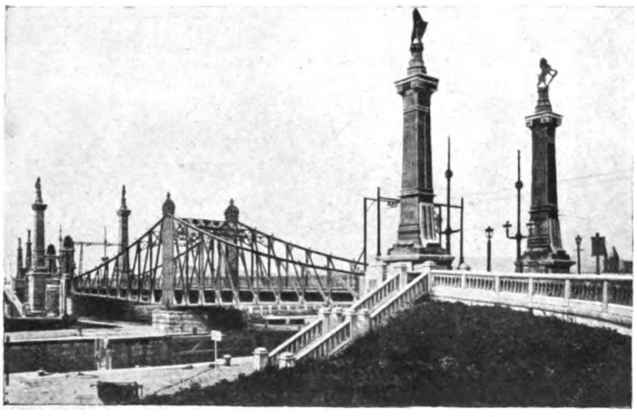
The construction of the overhead equipment was carried out under the supervision of the Hove Corporation officials by Messrs. Clough, Smith, and Company, Limited, Spencer House, South Place, London, E.C., who are the contractors for the "Cedes" Electric Traction Company, and also constructed their systems at Keighley and Aberdare.

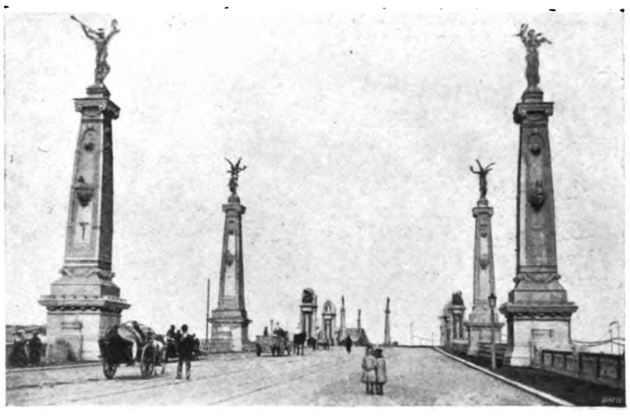
ELECTRIC RAILWAYS OF THE BELGIAN LITTORAL.

The electric line along the Belgian coast will henceforth possess the unhappy distinction of being the only interurban electric railway which has been the scene of one of the most critical battles in the world's history. "Stormed at with shot and shell" from the air, the water, and the land during the last two weeks of October, it has witnessed such scenes as could scarcely be imagined in those happier normal days that pass without incident in the coast resorts to which visitors come from all parts of the Continent in search of rest and recreation. From Westende, a little south of Nieuport, through Ostend and Blankenberghe to Knocke, a distance of some 30 miles, this district is well served by the handsome little white trains of the electric railway, which as recently as July last were filled as usual with the careless cosmopolitan throng of holiday makers. By a few only was the gathering war cloud in any way discernible. Throughout the coast, plans for a busy and prosperous season had been made, and the growing popularity of the Belgian coast was bringing an increasing number of visitors; and that large population which makes its livelihood by catering for these visitors was preparing for the welcome summer invasion. This year the sands were as golden, the air as bracing, and the sky as blue as ever; but war and its hideous train have turned Belgium into a place of distress and ruin. Gradually the Germanic hordes pressed further and further west. Day by day the seaside resorts grew more and more empty, until the last steamer left Ostend, and the whole coast was seized in the grip of war. Yet, in some respects, life went on as usual, in apparent strange oblivion of the overwhelming struggle which was to break on the sand dunes that have hitherto been only the peaceful playgrounds of children and holiday-makers. For some days, while the distant gun-fire could be heard, the electric railway trains plied to and fro with regularity. Presently its cars were filled with visitors and residents in flight, for at Knocke village, its southern terminus, the electric railway connects with one of those inconspicuous but exceedingly useful light steam railways which are a characteristic feature of Belgium, and by this means easy access was provided to Sluis, just over the Dutch border, and thence to Flushing. Later the service was reduced, the trains became irregular, and when fighting began at Nieuport, and the allies crept nearer Westende, the running of the electric trains was perforce abandoned. With notable pluck the company and their officers seem to have continued to run the trains as long as it was possible. No other electric railway, it is safe to say, has ever been worked under conditions so strenuous and dangerous; and the thousands of passengers who in the peaceful days to come, when Belgium is again able to offer the hospitality of her pleasant coasts, will travel by its cars, will be carried through the field of one of the most fiercely-contested struggles in modern history.



Map of Electric Railway along the Belgian Coast.





Electric Railway on the Ponts de Smet de Naeger at Ostend.

The line, which has probably suffered severely from the artillery and naval fire, is an interesting example of the way in which Belgian capitalists and engineers have applied electric traction so as best to meet the needs of their country. Their idea was to provide means of transport as economically as possible, and to

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give the districts along the coast the earliest opportunity for unrestricted development. Consequently the line has been constructed under conditions which would scarcely meet with the approval of our Board of Trade; in fact, it is doubtful whether it would be passed, but it is well designed for the purpose which the company had in view, and it is worked without inconvenience or serious danger to the public, which is to Westende. Although the track has a gauge of one metre the cars have a wide overhang, and are spacious and extremely comfortable. They are mounted upon two axles, and weigh about 12½ tons empty. The bodies are well hung, and the cars ride easily. They have transverse reversible seats with centre aisle, so that all passengers face in the direction in which the train is moving. They are equipped with two motors

Electric Railway Train at Duinbergen Station.

supposed to look after its own safety to a greater extent than is customary in this country. A light and cheap overhead construction and sleepered track offers a model, which, in many places, might be followed with advantage where traffic cannot be heavy, but where better facilities are needed. At Ostend, Knocke, and in some of the villages the tramway is constructed in a public thoroughfare, but for long stretches between the towns it passes along its own right of way. Throughout the route it is seldom far distant from the sea coast, often only a line of buildings intervening. The first section opened extended from Ostend to Blankenberghe, and extensions were subsequently made to Knocke, and to the south through Middelkerke of 45 H.P., and each is capable of drawing one or two trail cars weighing about 6·7 tons. The wheel base of the motor car is about 8 ft., and that of the trail car 9 ft. In spite of these long wheel bases the trains pass easily round curves with a radius of 60 ft. The energy consumed by these electric trains, weighing about 25 tons, is about 750 watts, at a speed of about 30 miles an hour. The electric equipment is of the usual type, but the bow trolley is used, and it has been found very satisfactory at high speeds. It is very efficient in keeping the trolley wire clean in spite of the oxidation produced by the sea air. A test showed that in the open, after a passage of 3,000 trains at a speed of about 30 miles per hour,

Station at Loop Terminus at Knock-Le Zoute.

Belgian Light Railway Train en Route to Sluis.

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the average wear of the trolley wire did not exceed ·1 mm.

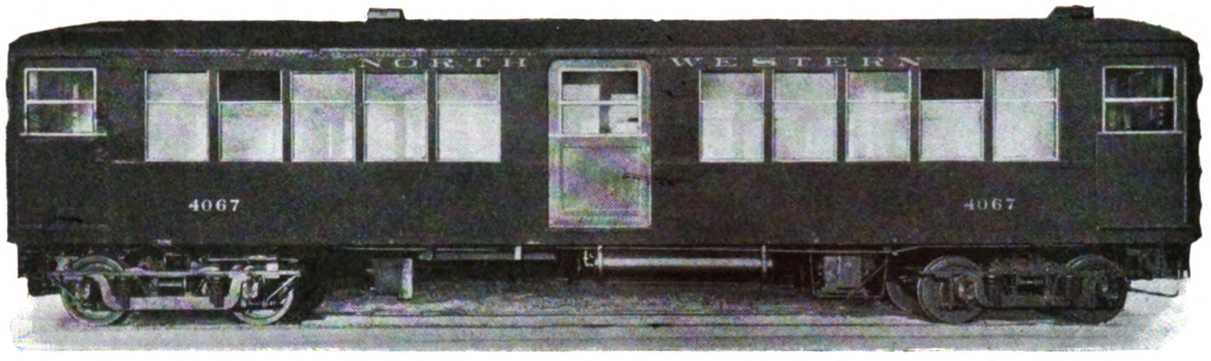
One of the power-stations is situated at Slykens, on the canal from Ostend to Bruges. The energy is generated by turbo-alternators, the boiler station being equipped with boilers of the Babcock and Wilcox type and Green's economisers. There is another station between Ostend and Blankenberghe. Several sub-stations are placed along the line, and these buildings are constructed in the style of a Swiss chalet, their architecture harmonising well with the dunes which surround them. At Ostend is situated a repair shop, which is well equipped with machine tools, etc. Adjacent to the shop is a car depot having 17 tracks, 198 ft. long by 214 ft. wide, having a capacity of 102 carriages. All the tracks in the shop are provided with pits.

The trains stop only at fixed halts, and at many places attractively-designed little station buildings, such as that at Duinbergen near the northern end of the line, have been provided at which passengers may obtain tickets before boarding the train, although tickets may be obtained from the conductor. Second and third-class tickets only are sold, there being no special accommodation for first-class passengers. Third-class passengers stand on the platforms, which are spacious and enclosed.

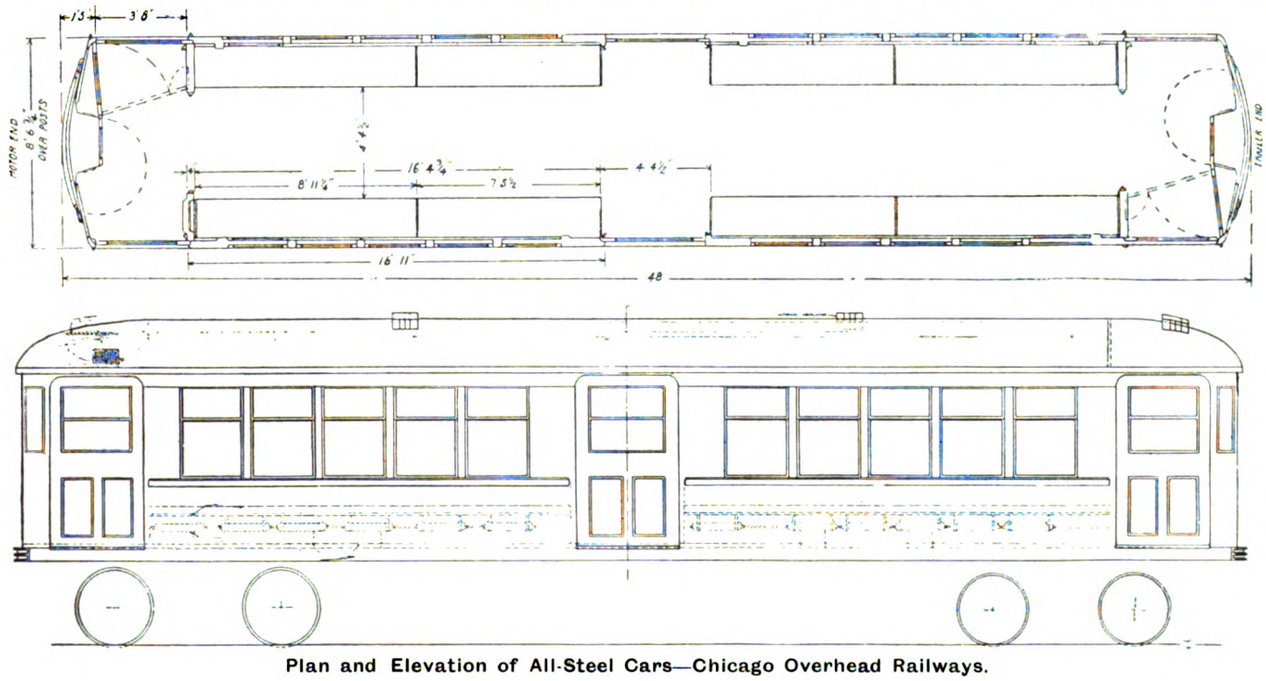
Light Railway Order.—The Board of Trade have confirmed the York Corporation Light Railways (Extensions) Order, 1914.

NEW ALL-STEEL CARS FOR CHICAGO OVERHEAD RAILWAYS.

The Chicago overhead railways recently ordered 62 motor and 66 trailer cars which present some interesting features that are, we believe, new to Chicago, but which have been introduced on London's underground railways. These features include all-steel material, fireproof construction, and centre doors. The value of the last-named improvement was first demonstrated in London, and is now generally adopted on urban high-speed lines where economy of time at stopping places is a first essential. The new Chicago cars are, however, of a novel appearance, and embody some details that merit attention; and by the courtesy of "Electric Traction," of Chicago, we reproduce several drawings and perspective views of these cars.



All-Steel Car—Chicago Overhead Railways.



Plan and Elevation of All-Steel Cars—Chicago Overhead Railways.

The seating capacity of each motor and each trailer car is 44, and the general dimensions are as follows:

	ft.	in.
Length of car body over end plates	48	0
Length of car body over corner posts	37	10
Extreme width over window sills	8	8 3/16
Height of car (light) from top of rail to top of roof	12	3 1/2
Height of car floor from top of rail	3	9 11/16
Distance between centre of trucks	33	8

The side sills are 6-in. 8-lb. channels, while the centre sills, two in number, are 6-in. 12¼-lb. I-beams. On

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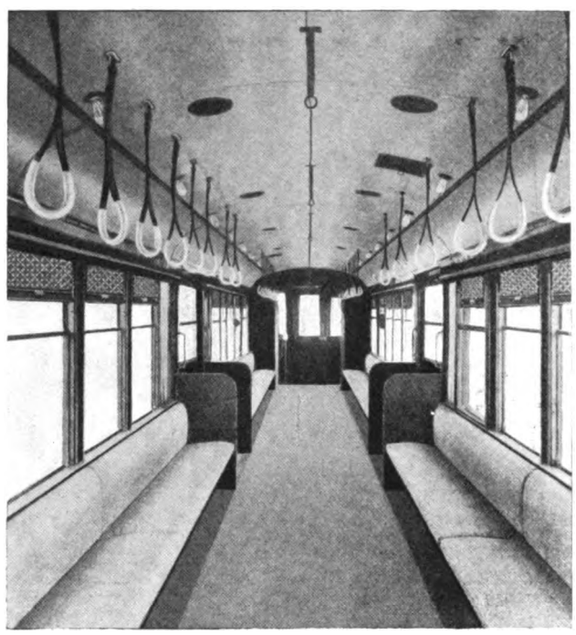
either side of the body bolsters the centre sills are reinforced by $\frac{3}{8}$-in. pressed-steel sections so as to stiffen the front of the car. There are four principal cross bearers, consisting of $\frac{1}{8}$ in. by 6 in. pressed-steel channel sections with $\frac{1}{8}$ in. by 4 in. top cover plates, and $\frac{1}{4}$ in. by 4 in. bottom plates. The intermediate cross bearers are $\frac{3}{16}$ in. by 4 in. pressed-steel channel sections. The end sills are similar to the side sills, being 6-in. 8-lb. channels, to the front of which are riveted heavy Hedley anti-climbers. Just inside the end sill channel and between the centre sills is riveted a box-shaped steel casting to transfer the buffing stresses to the centre sills.

The end sills have $\frac{3}{16}$-in. top cover plates and $\frac{1}{4}$-in. bottom plates, which are riveted to the end sills, side sills, centre sills, and the reinforcing casting, thus materially stiffening the end of the car. The ceiling plate, which is placed on top of the sub-frame members, is $\frac{1}{16}$-in. steel plate, on top of which is $\frac{1}{2}$ in. of Flaxlinum for a heat and sound insulator. On top of the ceiling plate is placed No. 22 gauge Chanarch sections, $\frac{5}{8}$ in. in height. On top of these sections Flexolith composition flooring is laid to a depth of



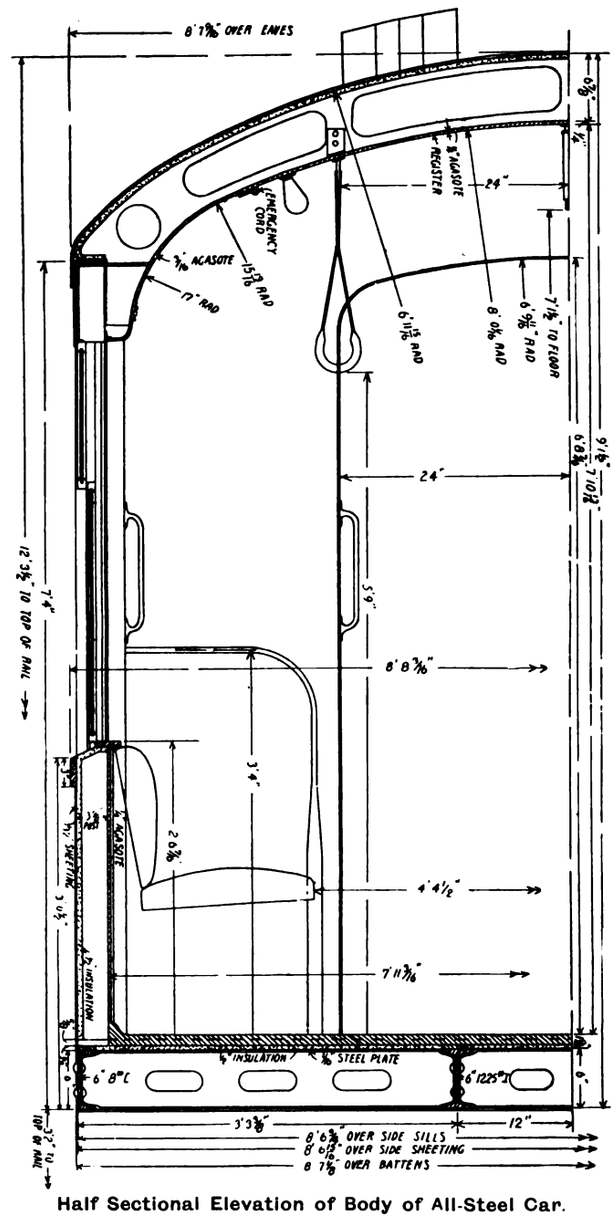
Interior of All-Steel Car—Chicago Overhead Railways.

1 in. Mason safety treads are used for threshold treads at both the end and side door openings. The body bolsters are of the plate type, and consist of two plates, the top one $\frac{3}{4}$ in. by 9 in., and the bottom one 1 in. by 9 in., separated by a steel casting. This casting not only forms a separator for the top and bottom plates, but also forms a housing for the Waugh draft rigging spring plates.

The side frame in these cars constitutes a plate girder, the lower members of which are the side sills, and the upper members are the letter boards and deck plates over the windows, these being tied together by $\frac{3}{32}$-in. steel sheathing below the windows, and by means of the window and corner posts. The letter boards consist of $\frac{3}{32}$-in. pressed-steel sections riveted to the deck plates and the posts. The deck plates are $3\frac{1}{2}$ in. by $2\frac{1}{2}$ in. by $\frac{1}{4}$ in angles, and extend in one continuous piece from end to end of the car. The inside of the sheathing and the sides of the window posts are insulated by $\frac{1}{2}$-in. Flaxlinum. The belt rail consists of $\frac{1}{2}$ in. by 3 in. mild steel, and the window plate of $\frac{1}{8}$-in. pressed-steel section with joints welded at the posts.

The roof of the arched type is of $\frac{1}{16}$-in. steel plate, and is supported by pressed steel carlines. Just beneath the underside of the roof plate is a $\frac{1}{2}$-in. layer of Flaxlinum for insulation purposes. The window posts are $\frac{3}{32}$-in. pressings, and the bulkhead posts $\frac{1}{4}$-in. pressed sections.

There are six sliding doors, four at the ends, and two at the centre of the car. The end doors are operated by pneumatic door engines, controlled by rods leading to the guard's niche. The centre doors are controlled from either end of the car by means of remote-control



Half Sectional Elevation of Body of All-Steel Car.

push buttons, connected to magnets which operate the air engine valves.

The car body is fitted with 20 side window openings with raised sash. The entire interior of the car, including the space between the floor and the window sills, the inside of the bulkheads and the ceiling, is sealed with $\frac{1}{4}$-in. Agasote. On the side of the bulkheads toward the vestibules $\frac{1}{16}$-in. steel plates are used. Longitudinal seats, 16 ft. $4\frac{3}{4}$ in. long, extend in either direction from the centre doors on both sides of the car. The seat frames are of pressed steel. Four Keystone side destination signs are placed in the upper sash of side windows near the ends of the car.

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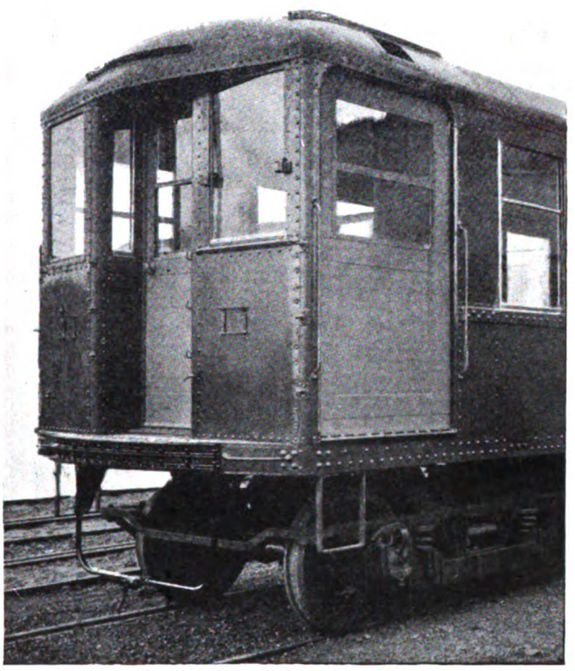
The car is heated by 24 consolidated electric heaters placed underneath the seats, 12 on a side. Ventilation is secured through a combination of the mechanical and automatic systems, the former being the Cooke, and the latter the Railway Utility and the Auto Utility systems. The fan for the former system is placed above one of the vestibule ceilings. Air is drawn in through openings in the floor under the heaters, and is exhausted through openings in the roof.

The interior is finished in mahogany with the ceiling a light buff colour, an excellent shade to diffuse the light. The lights, 23-watt Mazdas, are placed in two rows on either side of the ceiling. There are 27 lamps per car; 20 between bulkheads, one above each sliding side door to illuminate the threshold, one arranged to illuminate the switchboard in the vestibule ceiling, and one in the centre of each vestibule ceiling. All vestibule lights are placed in lamp domes with white enamelled reflectors, the edges of the domes being set flush with the ceiling. The cars are also provided



End View of Motor Car—Chicago Overhead Railways.

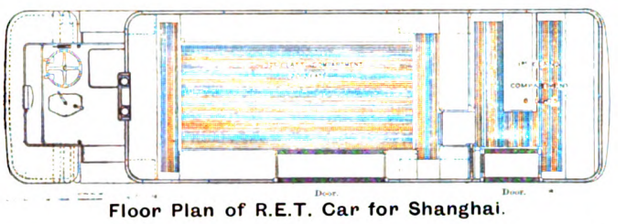
with hand straps with sanitary covers, which are clearly to be seen in the view of the car interior.

The trucks are of the American master car-builders and of the equalising-bar type standard design adopted by the Elevated Railroad Company, of Chicago. According to the company's practice, each motor car is equipped with one motor and one trailer truck. The motor trucks have a 78-in. wheel base, and are equipped with 34-in. rolled-steel wheels, while the trailer trucks have a 66-in. wheel base and are equipped with 31-in. rolled-steel wheels. The motors are the GE type 243, arranged for field control. The control is of the Westinghouse multiple-unit switch type, and the Westinghouse "Universal" control system of air brakes is used.

Iron and Steel Institute.—As previously announced, the autumn meeting of the Iron and Steel Institute, which it was proposed to hold in Paris, had unfortunately to be abandoned, and the Council decided, as a matter of courtesy to the prospective hosts of the Institute, that no alternative meeting should be held in this country. The general meeting will, however, as required by the rules, be held on Thursday, November 19, at 11 a.m., at the rooms of the Institute, 28, Victoria Street, London, S.W., when business of a purely formal character will be dealt with.

R.E.T. CARS FOR SHANGHAI.

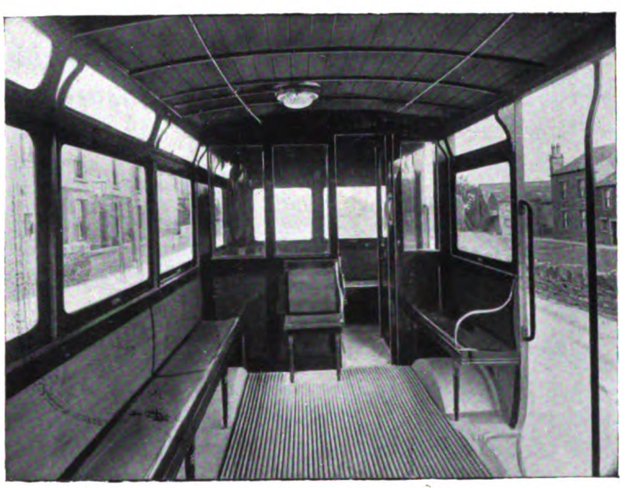
In our issue of October 8 some particulars were given of a new type of omnibus constructed by the R.E.T. Construction Company, in accordance with the specification of Mr. D. McColl, general manager of the Shanghai Electric Tramways. We now give a plan and interior view of this vehicle which, as will be seen, has been arranged so as to secure easy entrance and exit. Two compartments are provided, the larger for native passengers and the smaller for Europeans.



Floor Plan of R.E.T. Car for Shanghai.

Each compartment is entered by a separate door in the side of the car, but an interior door provides communication between them. The seats, which are arranged specially in accordance with Mr. McColl's plan, provide for 28 passengers, and there is standing room for as many more, so that the total capacity is 56.

Another special feature of the car to meet Mr. McColl's requirements is the life-guard, and it may be added that the Shanghai omnibus is the first railless omnibus to be fitted with this protection for pedestrians. Side-guards have also been provided for the rear



Interior of R.E.T. Car for Shanghai.

wheels. As mentioned in the previous notice the chassis is equipped with the R.E.T. single-worm drive, which under the most severe tests has given very excellent results.

Preston Corporation have received the sanction of the Board of Trade to borrow £7,000 for car shed and office extension, and £5,049 for six additional cars.

Huddersfield Extension to Brighouse.—The Huddersfield and the Brighouse Corporations, after long negotiations, have reached an agreement whereby Huddersfield Corporation will extend their tramway system to Brighouse. The former will seek powers in the forthcoming session to extend the tramways in order to carry out the arrangement.

Proposed Stalybridge Extensions.—The Stalybridge, Hyde, Mossley, and Dukinfield Tramways and Electricity Board have decided to apply in the next session of Parliament for an Act to enable them to construct and work additional tramways, to run motor omnibuses, to purchase tramways now belonging to the Oldham, Ashton, and Hyde Tramways Company and to the Hyde Corporation, and to construct an additional generating station.

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LONDON, NOVEMBER 5, 1914.

Traffics and the War.

The disturbance caused in this country by the European war has not so far very materially affected tramway traffic receipts as a whole. It is true that in some recent weeks the majority of the undertakings whose returns we regularly publish show decreases as compared with the corresponding weeks of last year, but in most cases the decreases are small. If we take the aggregates since the beginning of the financial year, it is found that the great majority of the undertakings show increases. It is worthy of special note that all the tramway undertakings in the metropolitan area, with slight exception, register substantial increases in their aggregate receipts for the part of the financial year which has gone. These are the undertakings which suffered so much from motor omnibus competition and not so long ago showed steady decreases. It is quite evident that the number of local passengers in the London district has diminished since the war began, and the underground railways have suffered heavily. So many, however, of the omnibuses have been requisitioned by the military authorities that the competition with the tramways has been materially reduced, so that the latter continue to do almost as well as they were doing just before the war began. As an example we take the principal undertaking, that of London County Council. Last year it got over its period of decreases in receipts caused by omnibus competition. For the first 17 weeks ended July 30 last of the present financial year the aggregate increase in traffic receipts was £33,992, which represents an average of practically £2,000 per week. For the 29 weeks ended October 21 (the last date available) the aggregate increase was £55,467. Thus we have an aggregate increase during the first twelve weeks of the war time of £21,475, which means an average of £1,790 per week. Accordingly the rate of increase has not materially fallen off since the war began. What the weekly receipts of the London General Omnibus Company may be like it is hard to say. Following the example of railways, the company ceased publishing traffic returns in the beginning of August, but its fleet of vehicles in service has been so much reduced owing to Government requirements that the traffic revenue cannot be anything like normal. For the 31 weeks ended August 1 last, when the last return was issued, the receipts showed an increase of £64,392.

Does the Risk Justify it?

The regulations preventing the usual lighting of streets and vehicles in London and elsewhere are subjecting tramway managers and their staffs to considerable inconvenience, and are increasing the difficulty of safely operating the cars at reasonable speeds. As a result, services in the evening are being reduced, and the running of the cars is less punctual and slower. These conditions necessarily entail some annoyance to the public, who are in other ways subjected to inconvenience by the absence of the usual lighting of the streets. The sum total of loss and bother entailed by the regulations now in force is by no means negligible, and the question must have occurred to many whether the precautions are really called for by existing circumstances. Unless the Admiralty and the War Office have very much more definite reasons to anticipate attacks by air than the public is permitted to know, it would seem that we are scarcely preserving the unruffled composure that from every point of view is desirable. If and when there is a reasonable probability of an aerial invasion, by

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all means let the utmost precautions be taken; but until such probability is established it would be better for us to go about our daily business as usual. Up to the present the chief evidence that an invasion by air is probable is the boastful assertions of the German newspapers that their airmen are on the point of departure for London. If their assertions are compared, however, with the feats hitherto accomplished by those same airmen, it does not appear that there are sufficient grounds for our groping about in darkness after nightfall for fear that our lights may serve to guide the enemy to our doors.

* * * *

If Zeppelins or aeroplanes were the formidable craft which they are claimed to be, is it conceivable that Paris and Antwerp would have escaped practically unscathed from the attacks of German aircraft? The opportunity was in full possession of the foe. Their lines in September were within a few miles of Paris, and it certainly was not because of a failure to make the attempt that the city and its inhabitants were not the victims of a ruthless and successful assault. The German airmen did in fact do their worst. Even when unresisted their efforts came to very little result; and when later they were met by French airmen an end was promptly put to the excursions, which may have provided interesting reports in the German papers but which achieved practically no other purpose. The Zeppelin raids on Antwerp were no more successful, although bases for operations were comparatively close at hand. And yet we are told that these same men and similar machines are to operate successfully at a distance of one or two hundred miles from their base. Equally improbable are the tales of vast additions recently made to the Zeppelin fleet. All the facts go to show that little more has been done in this direction than to make good the wastage. Even if the number of Zeppelins had been considerably increased, the probability of a successful attack would be little strengthened. Anyone who has followed the history of the Zeppelins, much more anyone who has inspected them and watched their manœuvring, can scarcely have acquired much faith in them as efficient fighting machines. They are unwieldy, slow to manœuvre, and must be handled with as much circumspection as a racehorse. They provide an easy target for attacks, while their own offensive powers are circumscribed by the small weight which they can carry. On the whole it appears that our precaution of cimmerian darkness is playing the German game. The public is worried by the impression that something much more serious than the published facts must be known by the authorities to justify so much inconvenience, while the enemy is convinced that he has only to make an appearance on our shores to so terrify the population that the country will provide an easy conquest. That is encouragement which the German public and the German armies now very much want, and it ought seriously to be considered whether it is wise for us to provide it for them, even though by not doing so we run possibly a little more risk.

Progress of the Electric Omnibus.

The electric omnibus appears to be making slow but steady progress. Several Corporations, including Brighton, Southend, and South Shields, have already put in service a few vehicles of this type. In Brighton, omnibuses equipped with the Tudor battery have been in use for some time, and at South Shields and Southend, Edison battery omnibuses are now serving as feeders to electric tramways. Though the vehicles have not been long at work, reports show that they are proving reliable and fully up to the demands made on them. At Southend, the electric omnibus makes a circular trip of about half an hour, and at the end of each trip a 250-ampere charge is given to the battery for 10 minutes. In this way the daily mileage of the omnibus averages about 100 miles. York Corporation, as reported elsewhere in this issue, have placed recently an order for four single-deck Edison omnibuses, and other Corporations are considering the purchase of similar vehicles. In the meantime, private owners are placing orders for electric vehicles of various types, and there is a probability that the business will develop rapidly as soon as owners discover the reliability, convenience and economy of the present day electric accumulators. Harrods, Limited, one of the largest general stores in London, who were pioneers in the use of big electric vehicles for town delivery work in the London area, have found them very satisfactory.

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THE FINANCIAL POSITION.

(By a Member of the Stock Exchange.)

Among the many other remarkable accompaniments of the great European War has been the unprecedented financial upheaval. Among the earlier signs of the coming disturbance was the closing, one after another, of the Bourses on the Continent, until at last London and New York remained the only important stock exchanges open for business. After doing its best to meet an avalanche of selling on the Continent and corresponding selling here, the London Stock Exchange closed on the morning of July 31, and Wall Street followed suit on the same date, although in geographical time, of course, the New York Stock Market remained open later than any other great international exchange. On Saturday, August 1, the further alarming development of a rise in the Bank of England rate of discount to 10 per cent. took place, followed in the Bank Holiday week by the extension of the usual August Bank Holiday from Monday to Thursday inclusive. During this fortunate interval the leading financial authorities, in conjunction with the Chancellor of the Exchequer, were able to make such complete and successful arrangements that the most acute phases of the financial crisis were removed. There is not much doubt that Germany had deliberately counted upon wrecking the financial system of London, the greatest international centre of credit, and, but for the skill of our leading financial authorities, and the timely assistance of the Government, they might have succeeded.

It is impossible here to go into all the details of the dangers that were encountered, and the corresponding remedies that were applied. Reference should be made, however, to the Moratorium, which was never before experienced in London on such a scale, and to the special steps taken to meet demands on the currency. Some of the recent weekly returns of the Bank of England indicate in a striking way the strong recovery in the financial position of the central institution, around which the whole of the credit system of the country revolves. The Bank return for the week ended August 5, 1914, showed a reserve of less than £10,000,000, and the ratio of liabilities less than 15 per cent. The return to October 28, however, showed the reserve had increased to about 45¼ millions, and the ratio to liability to over 29¾ per cent. The total amount of coin and bullion in the banking and issue departments on August 5 was slightly over 27½ millions, but on October 28 this total had reached over 61¾ millions. In addition, gold to the amount of 9½ millions, not included in the above figures, has been set aside for the Treasury notes redemption fund. In other words, it forms a gold reserve for the special currency created since the war began, in the form of 10-shilling and 20-shilling Treasury notes. The Bank of England rate was reduced to 5 per cent. so early as August 8, and that the reduction was more than justified is shown by the fact that three months' bills are now quoted about 3 per cent., and six months' bills under 4 per cent. Another indication of the return of strength in the financial position is the low average rates at which the Government has been able to place Treasury bills, to provide money for conducting the war. The most recent issue of 15 million pounds, running for six months, was placed at an average rate of less than 3¾ per cent. per annum. In all, 75 millions sterling Treasury bills have been placed since the opening of the war, in batches of 15 millions each, and the average rate for each batch has ranged from £2 18s. 6d. up to £3 15s. 6d. per cent. per annum, and a further batch of 15 millions just announced are expected to go at about 3½ per cent. Another indication of a return to normal financial conditions is the termination of the general Moratorium early in November.

There is at the present time no indication of an early resumption of business on the Stock Exchange, and it is to be doubted whether a reopening at an early date will be arranged. The difficulties are numerous, but perhaps the outstanding one at the moment is the necessity for preventing any sales, direct or indirect, which might provide money for the enemy. So large a proportion of Stock Exchange securities now exist in the form of Bearer Bonds or their equivalent, as in the case of American Railway and other shares, that it is difficult—indeed almost impossible—to trace the origin of many transactions, either purchases or sales. Difficulties also arise in connection with the disastrous depreciation in securities, more particularly in connection with the loans to the Stock Exchange made by banks and other financial institutions, estimated to exceed 80 millions sterling. Under normal conditions, these loans are not only reasonably safe, but a very remunerative source of business to banks and other large capitalists. One of the necessary conditions of such loans is that "margins" of from 10 per cent. upwards are maintained, otherwise the loans become repayable, and for this purpose securities may be forced to market. Under the exceptional financial conditions recently prevailing, margins rapidly disappeared during the last few days in which the Stock Exchange was opened and, according to the letter of their contracts, many of the lenders would have the right to demand repayment of such loans, and in default to realise the securities. With so large an amount involved, however, and so limited a demand for stocks, it is clear that a general move in the direction indicated would only result in a long series of bankruptcies, without securing the repayment desired.

The Treasury, the Banks, and the Stock Exchange Committee are collaborating to devise plans for avoiding forced realisation of stocks and calling in of loans. From an official announcement published by the Treasury, it appears that the banks have already arranged not to press for repayment of loans, or to ask for further margins for a year after the conclusion of peace. In regard to other lenders, the Bank of England, acting for the Government, will advance 60 per cent. of the value of securities as at the market values on July 27 last—a decidedly liberal arrangement—subject to certain safeguards. Interest on such loans is to be at the rate of 1 per cent. above Bank rate, with a minimum of 5 per cent. The Stock Exchange Committee undertake to extend the facilities given them to their clients and other parties, as far as possible, and are about to amend their rules accordingly.

Since July 30, transactions on the Stock Exchange have been reduced to dealings on the telephone or in the "street" for cash only. As may be imagined, such transactions are almost entirely limited to dealings in the best securities, such as Trustee Stocks and British Railway securities. In connection with the latter, the arrangement whereby the Government virtually guarantees their net revenue on such a basis that average dividends may be maintained during the war, has been a distinctly helpful influence. By ruling of the Committee the bases for any dealings in the Trustee Stocks, and some other similar securities, have been definitely fixed, and transactions below the official minimum are forbidden. Such business as has taken place in these high-class stocks shows prices are not materially below those immediately preceding

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the war. The extraordinary success of the issue of £1,000,000 5 per cent. 10 year redeemable preference stock by the South Western Company at 99¾, now quoted at 104, is also an indication that there is still some demand for securities of a very high class. This was a Trustee Stock when issued at 99¾, but ceases to be so now that it has advanced beyond par. The money is required in connection with the electrification of the suburban lines of the company, with which good progress has already been made; and the issue may be commended to the attention of those who, as a consequence of the war, are inclined to view pessimistically the future of railway electrification in this country.

So far as tramway securities are concerned, in common with industrial securities generally, there has been very little business—not, indeed, sufficient to test the quotations. Holders have very wisely been content to await events, and only in the case of a few foreign tramways, which at the best of times are regarded as largely speculative, has there been any notable change in prices since July. The earnings of these undertakings must necessarily suffer, probably to an increasing extent if war is prolonged, but so far there has not been anything like a disastrous shrinkage in receipts. Bearing in mind that the stability of the financial and industrial system in this country will certainly be one of the deciding factors in the war, it is satisfactory to note that the conditions are steadily improving, and that the calculations of the enemy, based upon a complete breakdown of British credit, have been wholly falsified. On the contrary, the most extreme test that the financial system of this country could ever be called upon to endure has only served to show its truly remarkable strength.

THE HADFIELD RESEARCH PRIZE.

The council of the Iron and Steel Institute announces that a research prize of the value of £200 has been placed by Sir Robert A. Hadfield, F.R.S., past president, at the disposal of the council, to be awarded by them for original research work on the subject of the different forms or combinations of carbon in iron, steel, and alloys of iron with other elements. Competition for the prize is open to metallurgists, chemists, and others interested in metallurgy, and it is proposed that the prize shall be awarded at the annual meeting of the Institute in May, 1916, for the best report presented before February 1, 1916. Sir Robert Hadfield is also prepared to offer a second prize for the report next in merit to the one which gains the first prize, provided it is adjudged to be a really meritorious paper.

It is not desired to limit the scope of the research too closely, but it is suggested that the work should be in continuation of, or based upon the work of previous investigators, such as Jullien, Abel, Müller, Ledebur, T. Sterry Hunt, Akerman, Arnold, E. D. Campbell, Hogg, Parry, and others. The object of the research prize is to stimulate the study of carbides in iron and iron alloys generally, also with a view to discovering the best method of determining the forms and combinations in which carbon occurs in iron and steel. These carbides are now spoken of by metallurgists in a general way, as sub-carbides, carbides, or double carbides. It is very desirable to define the composition of these more accurately and to ascertain whether other carbides exist which have hitherto not been identified.

The study of the molecular constitution of the carbides will also fall within the range of the investigation and, in this connection, attention may be directed to previous researches on particular combinations of carbon or forms of carbide. For instance, it would be of interest to determine whether the ordinary carbide is Fe_3C, Fe_6C_2, or some other combination. If so, what is its nature and molecular constitution?

The foregoing is a general direction which should guide intending participants in this research. It is hoped that the results obtained will throw much light on the cause of hardness of steel, also on the nature and form of carbon combinations with iron and its alloys.

Intending competitors should communicate, in the first place, with Mr. G. C. Lloyd, secretary of the Iron and Steel Institute, 28, Victoria Street, London, S.W.

Tramway Assessments.—Deputations from East Ham and West Ham Assessment Committees will hold a conference with the object of securing a settlement of outstanding difficulties in regard to the assessment of the tramway undertaking in respect of towns.

THE KILOWATT RATING OF MOTORS.

By H. M. Hobart.*

The 1914 Standardisation Rules of the American Institute of Electrical Engineers require that motors should be rated in kilowatts. On account, however, of the hitherto prevailing practice of expressing mechanical output in horse-power, the rules recommend that the rating of motors shall, for the present, be expressed both in kilowatts and in horse-power until such time as the industry shall become sufficiently accustomed to the new rating. As a convenient and closely correct equivalent, it is useful to remember that the horse-power rating of a motor may, for practical purposes, be taken as 4 to 3 of the kilowatt rating. In order to lay stress upon the preferred future basis, it is considered in the rules that it is desirable that on rating plates the rating in kilowatts shall be shown in larger and more prominent characters than the rating in horse-power.

In taking this step the American Institute of Electrical Engineers is simply falling in line with authoritative precedents. The subject was taken up by the International Electrotechnical Commission (I.E.C.), at the meeting held in Turin in September, 1911. In the fourth edition (published in 1914 by Julius Springer, Berlin) of Dettmar's little handbook dealing with the interpretation of the rules of the Society of German Electrical Engineers (Verband Deutscher Elektrotechniker) the latest (1913) standardisation rules of that society are considered. The subject of the kilowatt rating of motors is there discussed at some little length.

The following is a translation of that part:

"The horse power, the old unit for the output of motors, was replaced by the kW in the new edition of the standardisation rules adopted at the 1913 annual meeting of the V.D.E. In taking this step, the Commission has accepted the following conclusion of the Sub-Committee on Units and Formulæ:

"'The technical unit of output is the kilowatt. It is practically equal to 102 kilogrammeters per second, and corresponds to 10^{10} ergs per second. The abbreviation is kW.'

"Furthermore the Commission is in agreement with the resolution adopted by the I.E.C. in 1911. This resolution reads:

"'1. The output of electric generators is defined as the electrical power available at the terminals.

"'2. The output of electric motors is defined as the mechanical power available at the shaft.

"'3. Both electrical and mechanical powers shall be expressed in International watts.'

"The introduction of the kW rating of motors will undoubtedly be attended with great difficulties. Indeed, it has taken 20 years to reach the decision to replace the horse power by the kW. Already in 1891 W. Kohlrausch made the proposal at the International Electro-Technical Congress at Frankfort.

"During the transition stage until the kW has become established as the unit of mechanical output, difficulties and misunderstandings with the purchasers can easily occur. A good many motor manufacturers have always considered that these difficulties could be best overcome in giving a horse power designation to the motors in addition to the kW designation of their output. The Commission has given this view careful consideration and has concluded that such a plan is not to be recommended, since it would only result in materially lengthening the transition period. As long as the horse power still appears on the rating plate, the purchaser will not accustom himself to the kW. In order to abbreviate the transition period as much as possible, it is therefore advisable to exclusively employ the kW. Consequently the Commission unanimously passed a resolution that the kW rating shall be exclusively employed upon the rating plate.

"The members of the V.D.E. were made acquainted with this resolution in the columns of the E.T.Z. A desirable means of simplifying the calculation of the equivalent rating on the part of the purchaser during the transition stage consists in arranging that for several years a card shall be attached to each machine on which the following conversion figures are given:

"1 kW = 1.36 hp

"1 hp = 0.735 kW

* Mr. H. M. Hobart, who is well known in this country, is a consulting engineer of the General Electric Company, of New York, U.S.A., from whose "Review" this article is reprinted.

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"For the sake of completeness the equivalents in kilogrammeters per second should be included. The corresponding conversion factors are as follows:

"1 kW = 1.36 hp = 102 kgm per second
"1 hp = 0.735 kW = 75 kgm per second
"1 kgm per sec. = 0.0098 = kW = 0.0133 hp."

It will be noted that the above conversion factors relate to the *Continental* horse-power. While the Continental horse-power is equal to only 735 watts, the horse-power employed in America and Great Britain is equal to 746 watts. This difference and the confusion thereby involved constitute an additional reason for preferring the KW. rating of motors. For America and Great Britain the conversion factors become as follows:

1 KW. = 1·34 H.P. = 102 kg-m. per second.
1 H.P. = 0·746 KW. = 76·0 kg-m. per second.
1 kg-m. per sec. = 0·0098 KW. = 0·0131 H.P.

In a paper entitled "Method of Rating Electrical Apparatus," by Merrill, Powell, and Robbins, published in the February, 1913, issue of the Proceedings of the American Institute of Electrical Engineers, the authors (who constituted the sub-committee appointed by the Standards Committee of the A.I.E.E. to report on the subject of "Rating Electrical Machinery") put the case as follows:

"From the pure science standpoint, the kilowatt is a better unit of power than the horse power since it is based directly upon the absolute c.g.s. system, the watt being equal to 10^7 dyne-centimeters per sec., while if we accept the definition of the horse power as being 550 ft.-lb. per sec., it is a gravitational unit and so is not strictly constant, but varies slightly with the latitude.

"Also the kilowatt is the practically universal unit for the measurement of electrical power throughout the civilised world, while the 'horse power' besides varying on account of its being a gravitational unit is defined differently in different countries. In several European countries it is defined as 75 kg-m. per sec., while here it is 550 ft.-lb. per sec. The difference is about 1½ per cent.

"Then too there seems to be no real reason why both electrical and mechanical power should not be expressed in the same units, and since the kilowatt is much more desirable as a universal unit than the horse power for the reasons enumerated, it is recommended that the output of motors be expressed in kilowatts instead of in horse power."

To assist in facilitating the use of the kilowatt and the watt as universal units of power, as well for the physicist as for the engineer and the layman, the following more extended table of equivalents has been prepared.

TABLE OF EQUIVALENT VALUES FOR POWER EXPRESSED IN VARIOUS ENGLISH AND METRIC UNITS.

	Watt.	Kilowatt.	English H.P.	Continental H.P.	Kg M. Per Second.	Ft.-Lb. Per Second.	Kg-Cal. Per Second.	B.T.U. Per Second.
1 watt is equal to	1·000	0·001000	0·00134	0·00136	0·102	0·737	0·000238	0·000947
1 KW. is equal to	1000·	1·000	1·34	1·36	102·0	737·	0·238	0·947
1 English (and American) H.P.	746·	0·746	1·000	1·015	76·0	550·	0·178	0·707
1 Continental H.P.	735·	0·735	0·985	1·000	75·0	541·	0·175	0·696
1 kg m per second	9·81	0·00981	0·0131	0·0133	1·000	7·23	0·00234	0·00930
1 ft.-lb. per second	1·36	0·00136	0·00182	0·00185	0·138	1·000	0·000324	0·00129
1 kg-cal. per second	4200·	4·20	5·61	5·70	427·	3090·	1·000	3·97
1 B.T.U. per second	1055·	1·055	0·415	0·422	107·6	778·	0·252	1·000

It is unfortunate that there should be so many alternative units of power in use. To fix ideas as to their relative magnitude they are arranged in the following table with the smallest unit of power at the head of the table, and the largest unit of power at the foot of the table. In the second and third columns are given their equivalents in watts and kilowatts.

1 watt	= 1·000	watts	= 0·001000	KW.
1 ft.-lb. per sec...	= 1·36	watts	= 0·00136	KW.
1 kg-m. per sec...	= 9·81	watts	= 0·00981	KW.
1 Continental H.P.	= 735·	watts	= 0·735	KW.
1 English (and American) H.P.	= 746·	watts	= 0·746	KW.
1 KW.	= 1000·	watts	= 1·000	KW.
1 B.T.U per sec.	= 1055·	watts	= 1·055	KW.
1 kg-cal. per sec.	= 4200·	watts	= 4·20	KW.

EDINBURGH TRAMWAY LEASE.

A draft minute of agreement between the Lord Provost, Magistrates, and the Council of the City of Edinburgh and the Edinburgh and District Tramways Company, Limited, and Messrs. Dick, Kerr and Company (lessees of the Edinburgh Corporation Tramways), was discussed at a meeting of the Tramways Committee of the Town Council on October 14. The draft agreement provides that the Corporation shall take over at a valuation the rolling stock, cables and other plant, stores, and movable effects used by the trawway company in working the tramways under the lease, and the tramway company shall sell and deliver the same to the Corporation on the expiry of the lease—namely, at midnight, June 30, 1919, or at an earlier date if agreed upon between the parties. The tramway company are to continue to keep, maintain, and, where necessary, replace the stock and the effects in efficient working order during the lease. The price to be paid by the Corporation on the transfer of the stock and effects is to be fixed, failing agreement, by an arbiter to be agreed upon between the parties, or, failing such agreement, to be appointed by the Board of Trade. In fixing the price the contingencies of the cable system are to be kept in view, but without any consideration of goodwill.

SELF-PROPELLED CARS.

The tramway company are to allow the Corporation, free of charge, to make experimental trials with self-propelled cars upon such portions of the present tramways as may be arranged between the two parties provided that the trials are made at times and in a way not interfering with the ordinary working of the system. The tramway company are to be kept free of any loss or injury through such experiments. In the event of the Corporation constructing a tramway from a point at or near the Craiglockhart terminus to the Redford Barracks or Colinton, the tramway company during the lease, if desired by the Corporation, are to work the same as a tramway with self-propelled vehicles provided by the city and run in connection with the city tramways. The receipts from the traffic on these new lines will go to the Corporation, who will recoup the tramway company and free them from all expense and loss on the working. In the event of the Corporation acquiring the undertaking of the Colinton Tramway Company, the Corporation undertake not to construct a line by Slateford, for which that company hold statutory powers, during the continuance of the present tramway lease unless with the consent of the tramway company. The discussion of the agreement was adjourned.

LONDON COUNTY COUNCIL AND FOREIGN ORDERS.

The Special Committee on Rules for procedure have advised the London County Council to adopt the following rule with reference to the purchase of manufactured articles: "In the purchase of manufactured articles preference shall, whenever possible, be given to those goods which have been wholly or in part manufactured within the United Kingdom." This is an encouraging indication that a change is taking place in the attitude of the Council toward home industry. Not infrequently we have had occasion to note that the Council have placed orders abroad which could quite as well have been executed in this country. It is true that in some of these cases there was a certain saving effected in placing the order abroad, but considering that the work in many cases, especially in the manufacture of rails, included a large proportion of expense for labour, and that this money was paid to foreign workmen, the net result probably left a generous balance in favour of the foreigner.

Power from Waste Gases.—The British Westinghouse Company have just issued a copy of a new circular under this title. The pamphlet has a striking cover in colours and is finely illustrated with photographic reproductions of the Westinghouse gas engines, and it should be in the hands of all those contemplating equipment of plant of this character. An account is given of several interesting installations, together with estimates of typical capital and running costs. An interesting portion of the circular deals with power from blast furnace gas from which interesting developments may be expected in the near future.

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TRADING WITH THE ENEMY ACT, 1914.

This Act is of so much importance to many of our readers, both at home and abroad, that we give the text in full:

4 AND 5 GEO. 5. CH. 87.

An Act to make provision with respect to penalties for Trading with the Enemy, and other purposes connected therewith. [18th September, 1914.]

Be it enacted by the King's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

PENALTIES FOR TRADING WITH ENEMY.

1.—(1) Any person who during the present war trades or has, since the fourth day of August nineteen hundred and fourteen, traded with the enemy within the meaning of this Act shall be guilty of a misdemeanour, and shall—

(*a*) on conviction under the Summary Jurisdiction Acts, be liable to imprisonment with or without hard labour for a term not exceeding twelve months, or to a fine not exceeding five hundred pounds, or to both such imprisonment and fine; or

(*b*) on conviction on indictment, be liable to penal servitude for a term not exceeding seven or less than three years or to imprisonment with or without hard labour for a term not exceeding two years, or to a fine, or to both such penal servitude or imprisonment and fine;

and the court may in any case order that any goods or money, in respect of which the offence has been committed, be forfeited.

(2) For the purposes of this Act a person shall be deemed to have traded with the enemy if he has entered into any transaction or done any act which was, at the time of such transaction or act, prohibited by or under any proclamation issued by His Majesty dealing with trading with the enemy for the time being in force, or which at common law or by statute constitutes an offence of trading with the enemy:

Provided that any transaction or act permitted by or under any such proclamation shall not be deemed to be trading with the enemy.

(3) Where a company has entered into a transaction or has done any act which is an offence under this section, every director, manager, secretary, or other officer of the company who is knowingly a party to the transaction or act shall also be deemed guilty of the offence.

(4) A prosecution for an offence under this section shall not be instituted except by or with the consent of the Attorney-General:

Provided that the person charged with such an offence may be arrested and a warrant for his arrest may be issued and executed, and such person may be remanded in custody or on bail notwithstanding that the consent of the Attorney-General to the institution of the prosecution for the offence has not been obtained, but no further or other proceedings shall be taken until that consent has been obtained.

(5) Where an act constitutes an offence both under this Act and under any other Act, or both under this Act and at common law, the offender shall be liable to be prosecuted and punished under either this Act or such other Act, or under this Act or at common law, but shall not be liable to be punished twice for the same offence.

POWER TO INSPECT BOOKS AND DOCUMENTS.

2.—(1) If a justice of the peace is satisfied, on information on oath laid on behalf of a Secretary of State or the Board of Trade, that there is reasonable ground for suspecting that an offence under this Act has been or is about to be committed by any person, firm, or company, he may issue a warrant authorising any person appointed by a Secretary of State or the Board of Trade and named in the warrant to inspect all books or documents belonging to or under the control of that person, firm, or company, and to require any person able to give any information with respect to the business or trade of that person, firm, or company to give that information, and if accompanied by a constable to enter and search any premises used in connection with the business or trade, and to seize any such books or documents as aforesaid:

Provided that when it appears to a Secretary of State or the Board of Trade that the case is one of great emergency and that in the interests of the State immediate action is necessary, a Secretary of State or the Board of Trade may, by written order, give to a person appointed by him or them the like authority as may be given by a warrant of a justice under this sub-section.

(2) Where it appears to the Board of Trade—

(*a*) in the case of a firm, that one of the partners in the firm was immediately before or at any time since the commencement of the present war a subject of, or resident or carrying on business in, a state for the time being at war with His Majesty; or

(*b*) in the case of a company, that one-third or more of the issued share capital or of the directorate of the company immediately before or at any time since the commencement of the present war was held by or on behalf of or consisted of persons who were subjects of, or resident or carrying on business in, a state for the time being at war with His Majesty; or

(*c*) in the case of a person, firm or company, that the person was or is, or the firm or company were or are, acting as agent for any person, firm, or company trading or carrying on business in a state for the time being at war with His Majesty;

the Board of Trade may, if they think it expedient for the purpose of satisfying themselves that the person, firm, or company are not trading with the enemy, by written order, give to a person appointed by them, without any warrant from a justice, authority to inspect all books and documents belonging to or under the control of the person, firm or company, and to require any person able to give information with respect to the business or trade of that person, firm or company, to give that information.

For the purposes of this sub-section, any person authorised in that behalf by the Board of Trade may inspect the register of members of a company at any time, and any shares in a company for which share warrants to bearer have been issued shall not be reckoned as part of the issued share capital of the company.

(3) If any person having the custody of any book or document which a person is authorised to inspect under this section refuses or wilfully neglects to produce it for inspection, or if any person who is able to give any information which may be required to be given under this section refuses or wilfully neglects when required to give that information, that person shall on conviction under the Summary Jurisdiction Acts be liable to imprisonment with or without hard labour for a term not exceeding six months, or to a fine not exceeding £50, or to both such imprisonment and fine.

POWER OF BOARD OF TRADE TO APPLY FOR RECEIVER IN CERTAIN CASES.

3.—Where it appears to the Board of Trade in reference to any firm or company—

(*a*) that an offence under this Act has been or is likely to be committed in connection with the trade or business thereof; or

(*b*) that the control or management thereof has been or is likely to be so affected by the state of war as to prejudice the effective continuance of its trade or business, and that it is in the public interest that the trade or business should continue to be carried on;

the Board of Trade may apply to the High Court for the appointment of a controller of the firm or company, and the High Court shall have power to appoint such a controller, for such time and subject to such conditions and with such powers as the court thinks fit, and the powers so conferred shall be either those of a receiver and manager or those powers subject to such modifications, restrictions or extensions as the court thinks fit (including, if the court considers it necessary or expedient for enabling the controller to borrow money, power, after a special application to the court for that purpose, to create charges on the property of the firm or company in priority to existing charges).

The court shall have power to direct how and by whom the costs of any proceedings under this section, and the remuneration, charges, and expenses of the controller, shall be borne, and shall have power, if it thinks fit, to charge such costs, charges, and expenses on the property of the firm or company in such order of priority, in relation to any existing charges thereon, as it thinks fit.

SHORT TITLE AND CONSTRUCTION.

4.—(1) This Act may be cited as the Trading with the Enemy Act, 1914.

(2) In this Act the expression "Attorney-General" means the Attorney or Solicitor-General for England, and as respects Scotland means the Lord Advocate, and as respects Ireland means the Attorney or Solicitor-General for Ireland.

(3) In the application of this Act to Scotland the Secretary for Scotland shall be substituted for a Secretary of State, and the Court of Session shall be substituted for the High Court; the court exercising summary jurisdiction shall be the sheriff court; references to a justice of the peace shall include references to the sheriff and to a burgh magistrate; and references to a receiver and manager shall be construed as references to a judicial factor.

(4) In the application of this Act to Ireland, the Lord Lieutenant shall be substituted for a Secretary of State.

(5) Anything authorised under this Act to be done by the Board of Trade may be done by the President or a Secretary or Assistant Secretary of the Board, or any person authorised in that behalf by the President of the Board.

Messrs. Doulton and Company have issued a finely-illustrated new catalogue of insulators showing a very large selection of standard types of cable insulators, etc., both in stoneware and in cream glazed vitreous porcelain of Lambeth manufacture. Many of the types have not been shown in the firm's previous catalogues, and the list has been brought up-to-date. In view of the fact that those who have previously purchased foreign-made goods will not now be able to get a supply from the Continent owing to the war, Messrs. Doulton are prepared to offer immediate supplies of their insulators, and are making special arrangements in their factory to increase the output.

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RAILLESS TROLLEY SYSTEMS AT BRIGHTON AND HOVE.

Brighton Town Council at a meeting on October 29 adopted a recommendation by the General Purposes Committee to inform Hove Town Council that they were unable to adopt the over-running system of railless traction for the purpose of the Brighton through routes, and that unless Hove Corporation agree to adopt the under-running system for the through routes, application will be made to the Board of Trade to appoint an arbitrator to determine the question. Thus the long-standing dispute between the two Councils as to the merits of the under-running and the over-running systems promises to be brought to an issue.

MR. HAMILTON FOR THE UNDER-RUNNING SYSTEM.

A sub-committee on railless traction of Brighton Corporation had obtained a report from Mr. J. B. Hamilton, general manager of Leeds City Tramways, who had inspected the experimental route on which had been installed the Cedes over-running trolley system. In his report Mr. Hamilton said that whatever the merits of the Cedes system, it was quite unsuitable for a double-deck vehicle. Even if the system were sanctioned by the Board of Trade, he would decline to take the responsibility for its operation. Mr. Hamilton further stated that: "The undoubted advantages in simplicity of construction and economy of working and freedom from likelihood of accidents of the under-running form of current collection as compared to the over-running, or Cedes, system should, in my view, be easily established before an arbitrator." The sub-committee concurred in the foregoing observations by Mr. Hamilton with regard to the unsuitability of the over-running system, and would be prepared to adduce other reasons against its adoption were it necessary. The sub-committee had considered the question with every desire of falling in with the views of the Hove Corporation, and of adopting the over-running system suggested by them, should circumstances permit. They were, however, quite satisfied that the conditions prevailing in Brighton were such as to render the adoption of that system most prejudicial to the success of the undertaking. They, therefore, recommended that the Hove Corporation be informed that the Brighton Corporation were unable to agree to adopt the over-running system for the purposes of the Brighton through routes, and that unless the Hove Corporation forthwith agreed to adopt the under-running system for the Hove through routes as requested by Brighton as long ago as June, 1913, application must be made by Brighton to the Board of Trade to appoint an arbitrator to determine the question as to the system to be adopted, as provided for under Section 15 (a) (1) of the Brighton Corporation Act, 1912. On the general question of the advantages of the railless traction system over a petrol traction system, the sub committee were advised by Mr. Hamilton that the saving of 2d. per car-mile in favour of the railless traction system, amounting to £10,416 per annum on the estimated mileage to be run in Brighton and Hove, mentioned in his estimate of February 21, 1913, was fully maintained under present conditions. The sub-committee desired further to point out that an increase in the cost of coal would not add to the cost of working the railless traction system in anything like the same proportion that an increase in the cost of petrol would add to the cost of working a petrol traction system.

MR. SELLON FAVOURS THE OVER-RUNNING SYSTEM.

Hove Town Council, on their part, obtained a report from Mr. Stephen Sellon, consulting engineer, on the Cedes over-running system. In the course of this document Mr. Sellon said: I am quite clear that everything that is necessary for the Hove traffic is practicable on the over-running system, while there is no special work in existence on any under-running trackless line which proves that the more complex conditions can be more satisfactorily met. Considering special work on trackless route only, I do not find that anything but simple cases have been tackled by the Railless Electric Traction Company on the under-running system. In my opinion, it would be unwise to use the tramway wires for a trackless 'bus on such busy routes as the Brighton tramways, and a much simpler construction at complex junctions can be effected if the wires are kept entirely separate. The statutory trolley vehicle through routes for Brighton and Hove involve eight crossings of single tramway wires by single trackless lines. This is too trifling to affect the choice of a system for the whole of the routes. Crossings of trolley wires by over-running trackless routes are simple, practical, and inexpensive, and they have the substantial advantage over crossings on the under-running system, that there is no mechanical crossing of opposite polarities and no "dead" length on either wire. Any increase in cost to Brighton of wiring the existing tramway route for the over-running as against the under-running system of trackless working will be a small proportion of the whole cost, and will be partly wiped out by the capital saving on the non-tramway routes. The advantages of appearance and saving in working expenses by the adoption of the Cedes system will much more than compensate for the balance of such additional expenditure. On the question of working expenses, Mr. Sellon expressed the opinion that the Cedes system would cost 1d. per car-mile less than the R.E.T. system, so that on the mileage run the two boroughs would save between £5,000 and £6,000 per annum. Mr. Sellon, in conclusion, recommended that the over-running overhead construction and the associated vehicles are most suitable to the conditions of Hove and on the through routes in Brighton, and that it is desirable to come to an agreement with Brighton Corporation by friendly discussion if possible.

BRIGHTON'S DECISION.

At the meeting of Brighton Corporation on October 29, when it was agreed to adhere to the under-running system, and to go to arbitration if necessary, Alderman Wilson, who moved the approval of that recommendation, said that the matter was one of urgency, as the time for the completion of the system expired on August 15 next year. A letter was read from Hove Town Council stating that they had received Mr. Sellon's report, and were now in a position further to discuss with Brighton the system to be adopted. In the course of discussion delay was recommended by some members, and Alderman Colbourne moved that the matter be deferred till the second meeting in November. This amendment was defeated by 31 votes to 19, and the recommendation of the General Purposes Committee, as mentioned above, was adopted.

GLASGOW TRAMWAY MEN IN TRAINING.

The photographs which are reproduced on this and the opposite page were taken at Gailes Camp, near Irvine, in connection with the 1st Glasgow Battalion Highland Light Infantry, which forms one of the civic battalions being raised by the Corporation for Lord Kitchener's Army, and is composed mainly of men employed in the Glasgow Tramways Department. The men are being trained in their tramway uniforms until their military uniforms are ready.

Non-Commissioned Officers of 1st Glasgow Battalion Highland Light Infantry.

Mess Orderlies at Dinner Time.

Ediswan Electric Service.—This is the title of a well-printed publication intended to show the progress of the Ediswan Electric Light Company, Limited, from time to time. The first issue contains some notes on the Ediswan incandescent lamps and electric fixtures, with interesting illustrations of various types.

Woven Cane for Car Seats.—The J. G. Brill Company, 110, Cannon Street, E.C., announce that they are one of the few concerns at the present time holding large stocks of woven cane for tramway and railway carriage seats. This can be supplied both lined with canvas and unlined. The shortage in the usual supplies finds them well equipped for executing orders for this material.

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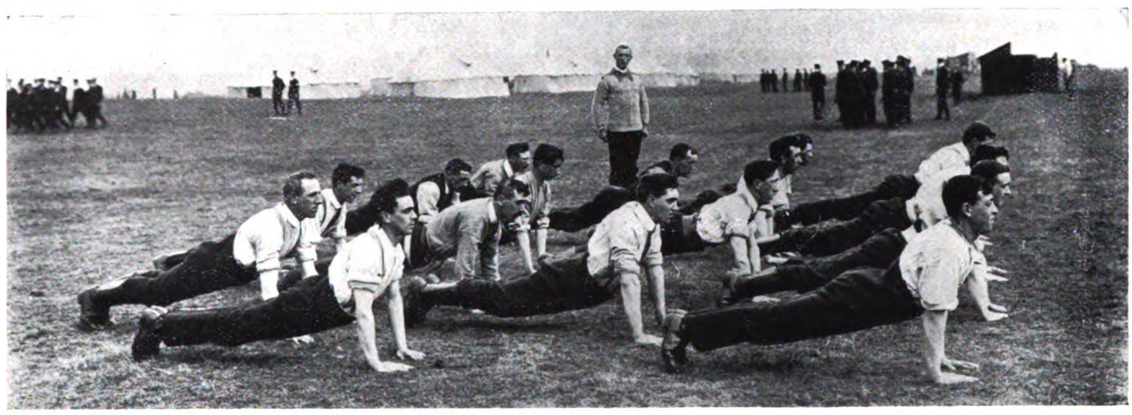
The 1st Glasgow Battalion Highland Light Infantry.

Physical Drill at Gailes Camp.



Physical Drill at Gailes Camp.

The 1st Glasgow Battalion H.L.I. at Gailes Camp.

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STREET AND ELECTRIC RAILWAYS IN AMERICA.

Remarkable Figures.

The bureau of the United States census has issued bulletin No. 124, including statistics for street and electric railways for the year 1912, covering all railways other than steam roads in operation during any portion of the year. Comparative statistics are also shown for the censuses of 1902 and 1890. The statistics for electrically-operated divisions of steam roads are included only in cases where full reports could be made therefor separate from those for steam road operation. In the case of electric railway companies selling electricity for lighting and industrial purposes, when it was impossible to obtain complete separate reports for the railways and for the electric light and power operations, data for both branches are included in the report for the railway. Comparisons for different censuses are to some extent affected by the inclusion of incomplete or estimated reports. The principal statistics are shown in the following comparative summary:

Comparative Summary, including Traffic, Income, and Capitalisation, 1912 and 1902.

	1912.	1902.	Per cent. of Increase, 1902-12.
Number of companies ..	1,260	987	27·7
Miles of line	30,437·86	16,645·34	82·9
Miles of single track	41,064·82	22,572·52	81·9
Rolling stock:			
Cars, number	94,016	66,784	40·8
Passenger	76,162	60,290	26·3
All other	17,854	6,494	174·9
Electric locomotives ..	277	3	—
Persons employed by operating companies:			
Number	282,461	140,769	100·7
Passengers carried	12,135,341,716	5,836,615,296	107·9
Revenue car-mileage ..	1,921,620,074	1,144,430,466	67·9
Passenger	1,885,870,157	1,120,101,944	68·4
Express, mail, and freight	35,749,917	24,328,522	46·9
Average number of revenue passengers:			
Per mile of track operated	232,556	212,217	9·6
Per revenue passenger car-mile	5·06	4·26	—

The total capitalisation in 1912 is reported as $4,708,568,141, an increase over 1902 of 104 per cent. Of this $2,384,344,513 was capital stock, and $2,324,223,628 was funded debt.

A special table is presented showing a comparison of income and expense on a passenger basis, showing that while the gross income per passenger increased from 5·25 cents in 1902, to 6·14 cents in 1912, the passenger revenue per passenger increased from 4·9 cents to 5·27 cents, and the operating expenses from 2·98 cents to 3·49 cents, making an increase in gross income less operating expenses from 2·27 cents to 2·65 cents, and an increase in net income from 0·64 to 0·65 cents.

Some Statistics for 1913.

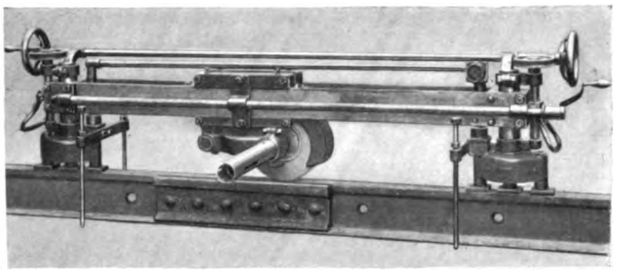
Figures, though not those of the Government, are also available for the year 1913. *The Electric Railway Journal*, of New York, publishes tables which it has compiled showing the condition of things at the end of last year. The figures relate to 1,187 electric railway companies, as compared with 1,260 companies in the census bulletin for 1912. The information is also much more limited in its scope, being confined to the items set out below. The following are the totals given for the whole of the United States:

Number of companies	1,187
Miles of track	45,004
Number of cars	97,721
Capital stock:	
Authorised	$3,460,140,440
Outstanding	$2,801,852,525
Funded debt:	
Authorised	$5,280,641,823
Outstanding	$2,814,334,098
Total stocks and bonds:	
Authorised	$8,740,782,263
Outstanding	$5,616,186,623

The figure here given for the total authorised stocks and bonds differs from the total given in the journal referred to, as the latter has evidently made a mistake in summing up the items or the printers have been at fault. The total here published is the sum of the two headings, capital stock authorised and funded debt authorised. It may be of special interest to readers in this country to note separately the return for the six New England States. In these there were 109 companies, with 6,379 miles of track and 15,628 cars. The total stocks and bonds were $470 109,950 authorised and $389,696,000 outstanding.

PORTABLE GRINDING MACHINES FOR RAIL JOINTS.

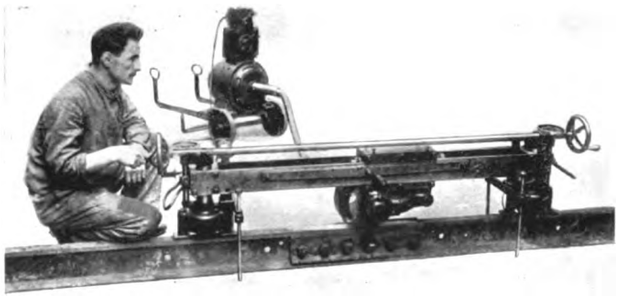
A new electrical grinding machine for tramway rails has just been placed upon the market by Messrs. S. Wolf and Company, of 115, Southwark Street, London, which embraces a number of features of interest to all concerned with the maintenance of tramway track. The machine, as the illustrations show, consists chiefly of a portable electric motor, to which is attached a combined starting switch for the motor and a switch for the holding-down magnets, the flexible transmission shaft, and the grinding machine itself. The machine is held in the required position on the rails by means of electro magnets, the coils of which, being made of aluminium wire, are absolutely impervious



Portable Grinding Machine.

to moisture. Each electro magnet carries a column which supports the slide on which the grinding wheel carrier travels, the carrier having a travel of 42 in. The slide can be raised and lowered on the columns by means of a worm and worm-wheel gear operating a fine-pitch square-thread screw. As the illustration shows, the shaft controlling the rise and fall of the slide runs the entire length of the machine, and is fitted with a hand wheel at each end, thus allowing depth of cut, etc., to be adjusted from either end of the machine, and ensuring that the slide is parallel with the rail which is to be operated on.

The grinding-wheel carrier is traversed along the slide by means of a square-thread leading screw and hand wheel. The ball bearings carrying the grinding spindle are, as the illustration clearly shows, carried in housings in the end of a rocking arm, which is held up by means of a strong steel spring. An adjustable former rail is bolted to the side of the slide in a suitable position. A former roller on the



Grinding Machine at Work.

rocking arm runs on this, and thus ensures that the grinding wheel follows the same path exactly as the former rail prescribes. This path can, of course, be either horizontal, inclined, or a curve, thus enabling a badly-worn rail joint either to be ground up level or the worn part to be finished off evenly.

Adjustable side supports are provided, so that should the current be suddenly cut off there is no fear of the machine falling.

The weight of the machine has been kept as low as is possible, and it can be easily carried by two men from one rail joint to another. It can, therefore, be quite legitimately described as portable in the widest sense of the word.

The supply circuit for the motor will be taken in the usual way from the overhead wire or the side rail by means of the usual trolley pole, bow, or shoe conductor, which, however, is not supplied with the machine. It is recognised that the users of this type of machine will prefer in most cases to use the standard fittings in use on their own system.

Provision is made for earthing the machine, so that it is immaterial whether the motor only or the electro magnets only are switched on, as in any case there is an instant connection to earth. The motor and

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starting switches are entirely enclosed, as well as the connection between them and the electro magnets on the machine itself; the cable is enclosed in steel tubing, the machine therefore being entirely weather proof.

The motor gives approximately 5 B.H.P. at 1,900 r.p.m., and both this and the electro magnets are built for continuous current of from 550 to 650 volts.

PERSONAL.

Mr. G. Broadhurst has been appointed electrical engineer of Basingstoke.

Mr. H. Bell, electrical engineer and manager of the Hull Corporation electricity works, is on active service.

Mr. Fred Coutts, general manager of Paisley Tramways, is serving as captain of the 5th Black Watch.

Mr. R. T. Mitchell will read a paper on "Electric Accumulators" on January 13 before the Association of Engineers-in-Charge.

Mr. J. H. Clothier, chief electrical engineer of the St. Annes on-Sea Corporation, has been granted an increase of £50 per annum in salary.

Alderman W. Thompson, chairman of the Blackburn Electricity and Tramways Committee, has accepted nomination as mayor for the forthcoming year.

Sir Robert Turnbull, general manager of the London and North Western Railway, retired from that position on October 1, and has been succeeded by Mr. Guy Calthrop.

Mr. N. B. Macaulay, senior engineer-in-charge of the Rhondda Tramways Company at Porth, has been appointed senior engineer-in-charge at Newport, Mon., electricity works.

Mr. S. Pearson, assistant works superintendent at Thornbury depot of the Bradford Tramways, has been appointed works superintendent in place of Mr. T. Richardson, who has resigned.

Mr. V. G. Lironi, electrical engineer of Portsmouth, has been granted an honorarium of £150 in consideration of the extra work involved in carrying out the last three tramway extensions.

Councillor R. Tootill, who has been elected unopposed as member of Parliament for Bolton, has received a resolution of congratulation passed by the Bolton branch of the Tramway and Vehicle Workers' Association.

Mr. Guy Calthrop, the new general manager of the London and North Western Railway Company, has become a member of the Railway Executive Committee in place of Sir Robert Turnbull, who has resigned.

Mr. G. H. Browne, chief assistant engineer and deputy manager of the Ilkeston Corporation Tramways and Electricity Department, has been appointed temporary engineer and manager during the absence of Mr. L. C. Bellamy with the Royal Naval Division.

Mr. George Kidd has recently been appointed general manager of the British Columbia Electric Railway Company, Limited, at Vancouver, B.C., in succession to Mr. Sperling, who has been appointed to a position on the London Board, as previously announced.

Mr. L. W. Horne has been appointed superintendent of the line of the London and North Western Railway. Mr. W. M. Turnbull becomes assistant superintendent of the line, and Mr. E. C. Grindley has been appointed indoor assistant to the superintendent of the line.

Mr. H. R. Griffiths has been appointed by the Great Western Railway Company as divisional superintendent at Bristol in succession to Mr. Charles Kislingbury, who has retired after upwards of 40 years' service with the company. Mr. Griffiths has been Mr. Kislingbury's assistant for 10 years.

Mr. C. W. Shepherd, general manager of the Edinburgh and District Tramways Company, and Mr. Robert Aitkin, accountant, have been presented by the board of directors, the former with a silver loving cup, and the latter with a silver rose bowl, on the occasion of their silver weddings.

Indian State Railways.—The Secretary of State for India in Council has, subject to the usual conditions, appointed the five undermentioned gentlemen to be assistant traffic superintendents on Indian State Railways: Messrs. R. Q. Cruttwell, V. L. Dean, D. H. Harrison, R. Proudlock, and E. A. Sims.

Melbourne Railway Electrification.—Mr. G. H. Wion, of the Pennsylvania Railroad Company, has been appointed by the Victorian Railway Commissioners as engineer to assist in the installation and supervision of the power and automatic signalling system in connection with the scheme for the electrification of the Melbourne suburban lines.

Mr. W. R. Rutherford, managing director of Dick, Kerr, and Company, Limited, was highly complimented at the annual meeting by Mr. Claude T. Cayley, the chairman of the company. Mr. Cayley, in replying to a vote of thanks to himself, to the board, and to the staff, said that they owed a great debt of gratitude to their managing director, Mr. Rutherford, for the extremely able manner in which he had managed the affairs of the company, both practically and financially. It had been quite an eye-opener to him (Mr. Cayley), and he wished to bring it to the minds of the shareholders that the directors immensely appreciate their managing director's efforts and hard work in connection with the affairs of the company.

Sir Edgar Speyer has retired from the partnership of Messrs Speyer and Company, of New York. The firm have notified the New York Stock Exchange that by virtue of the King's Proclamation of September 9, it became impossible for Sir Edgar, a partner in the firm, residing in London and a British subject, to have any direct or indirect connection with any firm doing business with persons resident in Germany. It is understood that Sir Edgar Speyer will resume his partnership after the war. As the head of the corporation which controls the system of the London Underground Railways and omnibus systems connected with it, London is specially indebted to Sir Edgar Speyer for the excellent service which it now enjoys.

Northampton Tramway Manager.—Although the Town Council, after prolonged discussion, recently refused to dismiss Mr. John Gottschalk, the tramway manager of Northampton, because he was of German birth and had not been naturalised previous to the war, they have since accepted his resignation, and have voted him £300. As already mentioned in these columns, Mr. Gottschalk, although born in Hanover, has lived in England for 27 years. He had not been naturalised previous to the war, as he had not thought it of importance; but papers were subsequently granted to him. Mr. Gottschalk on the outbreak of the war fully explained his position to the Tramways Committee, and it may be mentioned that he married an English wife and has a son serving in the British Army. The agitation against him was fomented by a comparatively small section of the public, but latterly the matter appears to have been made a question of local politics, and it seemed probable that if he was retained some contests on the subject would be forced at the municipal election, notwithstanding an agreement previously reached that there should be no contests this year.

Mr. R. C. Bullough, manager of the Colchester Corporation Tramways, has received a pleasant token of appreciation from the Town Council. Since the war broke out Colchester has been a great centre for troops, and one result has been a very large increase in the traffic on the tramways. The Tramways Committee reported to the last meeting of the Council that having considered the manager's special report relative to the extra number of passengers carried during the past few weeks, the committee resolved to place on record their appreciation of the manner in which Mr. Bullough and the whole of the staff had worked during a very difficult period. Mr. Jarmin, in moving the adoption of the report, said that they were now carrying 24,000 passengers weekly above the normal figures, and the receipts had advanced by nearly £100 weekly. It had from the first been decided to charge each man in His Majesty's service who was a tramway passenger a 1d. fare for any distance, and very large numbers of men had availed themselves of the concession. It was also to be noted that the large increase of traffic had to be dealt with within about four hours, namely, from 5-30 to 9-30 each evening. It would accordingly be well understood that the manager and the staff were very fully occupied during that period. Notwithstanding the temporary loss of about 25 per cent. of the tramway employees, that being the proportion which had joined the colours, the service had been well and efficiently maintained, while new men were being instructed. The average receipts per car-mile had increased from about 8d. to 11½d.

TRANSFERS FOR TRAMCARS AND RAILWAY CARRIAGES.

We have lately had an opportunity of inspecting some magnificent specimens of transfer work, coats of arms, lettering, etc., including a particularly elaborate specimen executed for the Mauritius Government Railway. No doubt many of our readers have the impression that transfers are made in Germany, but we are glad to find that the fine results we have seen are the production of a British firm, Messrs. Wm. Strain and Sons, Ltd., Great Victoria Street, Belfast. Messrs. Strain have for several years been steadily building up a good business in transfers in the face of very severe German competition, and, of course, at a time like this they are beginning to come into their own, and find themselves very busy indeed. They have, we understand, been favoured with contracts from the Government of India and several colonial Governments. Some of our readers who may have been using German goods are perhaps wondering about their future supplies, and they cannot do better than to communicate with Messrs. Wm. Strain and Sons, Ltd., of Belfast, who will be glad to supply full particulars in regard to their work.

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NEW CONTRACTS AND ORDERS.

Messrs. James Thompson and Son are supplying a vulcanising plant and lathe for a garage for the Glasgow Tramways.

Walter Scott, Limited, are to supply 250 tons of steel rails to Bolton Corporation Tramways on the terms of the existing contract.

Salford Electricity Committee have accepted the tender of Willans and Robinson, Limited, for a 5,000-kw. alternator at £10,410.

West Bromwich Town Council have ordered from the Brush Electrical Engineering Company, Limited, a 500-k.v.a. static transformer.

The Stirling Boiler Company are supplying two sets of boiler tubes and of replace links for two stokers at Neepsend power-house Sheffield.

The Glasgow Corporation Electricity Committee have ordered three electrical vehicles from Edison Accumulators, Limited, at a total price of £2,446.

A. Reyrolle and Company, Limited, have a contract from Sheffield Electricity Committee for 14 high-tension three-phase switch gear panels for the Neepsend station.

The Peacock Brake Company have an order from Southend-on-Sea Tramways Committee for the supply of brakes and sand gear for three electrically-driven coal wagons.

Hadfields, Limited, have been awarded the contract for points and crossings required during 1915 by the Bolton Corporation Tramways at the present contract price.

W. A. Stevens, Limited, have received an order from the Fire Brigade Committee of the London County Council for two petrol-electric chassis to carry Magirus ladders.

Cole, Marchent, and Morley, Limited, have received an order for 50 sets of power-brake equipment for trolley vehicles from the Bradford Corporation at a price of £72 per set.

The Tudor Accumulator Company have received an order from Grimsby Town Council for the maintenance of two batteries at the electricity works for a further period of 10 years.

The Daimler Company, Limited, recently received an order from Walsall Tramways Committee for four double deck and two single-deck omnibuses. The total amount of the order is £4,495.

Hull Tramways Committee have accepted a tender by the Sheffield Brightside Foundry and Engineering Company of £6,873 for the heating and ventilating of Liverpool Street workshops extension.

The British Insulated and Helsby Cables' tender for cables has been accepted by Warrington Town Council at £23 14s. per ton. The Albion Clay Company are supplying the earthenware conduits to the Corporation.

The British Westinghouse Electric and Manufacturing Company are to supply a 1,500-kw. rotary converter and transformer with switch gear, and a 1,200-kw. transformer and switch gear to Chesterfield Corporation.

The Crown Agents for the Colonies have recently accepted amongst others the following tenders: Mather and Platt, train lighting dynamos; Electric Construction Company, electric apparatus; R. Hudson and Company, tramway spares.

The British Mannesmann Tube Company are supplying 220 light steel poles to the Bradford Corporation for overhead trolley railless traction equipment at £4 11s. each, 80 medium steel poles at £6 8s. 1d. each, and 10 heavy steel poles at £7 8s. 7d. each.

Leeds Tramways New Offices.—W. Airy and Son have been awarded a contract by Leeds Corporation for the building of the new tramway offices in Swinegate and Briggate on a schedule of prices appertaining to the firm's contract for the adjacent new tramway depot.

Walthamstow Urban District Council have accepted the following tenders: Walter Scott, Limited, steel rails (Sandberg), fish plates, etc.; Edgar Allen and Company, castings; Bayliss, Jones, and Bayliss, fish bolts, rivets, and tie bars; Watlington and Company, copper bonds.

The Cedes Electric Traction Company, Limited, are supplying two trackless trolley vehicles at £810 each, and a second-hand railless trolley vehicle to Keighley Town Council. The same company has recently supplied a 30-cwt. electric vehicle to the Metropolitan Asylums Board.

Sydney (N.S.W.) City Council have placed a contract with the Australian Metal Company, acting for the Tudor Accumulator Company, for section A of the storage battery, the amount being £24,711. This contract was originally placed with the same firm acting as agents for the Allgemeine Electricitats Gesellschaft, of Berlin.

The United Electric Car Company, Limited, have an order for four tramcar bodies from Doncaster Corporation. The cars will be provided with Dick, Kerr and Company's electrical equipment and Peckham pendulum trucks. A supplemental estimate for the purchase of six new cars in addition to the above four is to be submitted to the Finance Committee for approval.

New Plymouth Tramways (N.Z.).—It is reported that Messrs. Greenshields and Company, of Wellington, have been awarded the contract for the construction of electric tramways, including the supply of cars and sub-station equipment, for the New Plymouth Borough Council. The cost is stated to be £49,926, and the work is to be completed by the end of next year.

Edison Accumulators, Limited, have an order from York Corporation for four single-deck electric omnibuses at £1,172 each. These vehicles will be fitted with Edison nickel steel accumulators, and will be similar in design to the vehicles recently supplied to Southend and South Shields Corporations. Edison Accumulators, Limited, also have an order from Belfast Tramways and Electricity Committee for an electric motor tower wagon.

Bury Town Council have accepted the following tenders: British Insulated and Helsby Cables, Limited, copper trolley wire, line ears, and straight line hangers; E. Smith and Company, strain wire; J. Russell and Sons, Limited, poles; F. R. Cass, small bases; Thermit, Limited, welding rail joints; Tramway Supplies, Limited, insulated bolts and Brooklyn strain insulators; Estler Brothers, Limited, section insulators; W. Scott, Limited, steel girder tramway rails; Bayliss, Jones, and Bayliss, Limited, tie bars; Leeds Steel Works, cross anchors; Edgar Allen and Company, Limited, clips.

The Peckham Truck and Engineering Company, Limited, of Queen Anne's Chambers, Westminster, have received the following orders through the Brush Electrical Engineering Company, Limited: Wallasey Corporation, six P-22 pendulum trucks fitted with "Thomas" automatic brake adjusters; Doncaster Corporation, four P-22 pendulum trucks fitted with "Thomas" automatic brake adjusters; Darwen Corporation, two pairs of P-25 pendulum gear maximum traction trucks; Southend-on-Sea Corporation, three P-22 pendulum geared trucks and three P-25 pendulum geared maximum traction trucks; Huddersfield Corporation, one P-22 pendulum geared truck; Colne Corporation, one set R-24 radial gears; Blackpool Corporation, one set pendulum gears and one set radial gears. The company have also received an order from Christchurch Tramway Board of New Zealand for two radial trucks.

London County Council Contracts.—At the meeting of the London County Council on October 13 the Highways Committee reported that the following contracts had been arranged:

REARRANGEMENT OF TRAMWAYS SUB-STATIONS AND PLANT, ETC.

John Marsland and Sons (accepted tender)	£2,436
A. Roberts and Company	2,521
Markham and Markham	2,561
J. and C. Bowyer	2,730
G. Godson and Sons	2,852
Charles Wall, Limited	2,918
High and low-tension cables—	
Western Electric Company (accepted tender)	24,001
British Insulated and Helsby Cables	24,524
Johnson and Phillips	24,689
Callender's Cable and Construction Company	24,824
W. T. Henley's Telegraph Works Company	25,100
W. T. Glover and Company, Limited	26,110
Siemens Brothers and Company	26,149
Laying of stoneware cable ducts, etc.—	
Foote and Milne (accepted tender)	2,268
William Griffiths and Company	2,555
May, Mortimer, and Company	5,971

SUPPLY OF TRAMWAY MATERIAL.

During the recess the Highways Committee purchased the following tramway material:

	Approximate amount.
200 pairs of motor axle bearings—The Anti-Attrition Metal Company, Limited	£200
18,000 ft. rubber hose for magnetic brakes—D. Moseley and Sons, Limited	149
Six tons of plain tread plate—J. Billingham	108
1,200 carborundum blocks for rail grinding—Carborundum Company, Limited	263
200 cast-iron yokes—Anderston Foundry Company, Limited, and J. Martin and Son (100 each)	139
One ton of tinned copper strip—London Electric Wire Company and Smiths Limited	96
3,000 rail clips for extended yokes—Armstrong, Stevens, and Son, Limited	200
Bolts, bars, clips, etc.—Bayliss, Jones, and Bayliss, Limited	568
1,700 yokes—Anderston Foundry Company, Limited	1,132

SUPPLY OF STEEL TIRES.

At the end of April the Council accepted a contract of John Batt and Company (London), Limited, for the supply of 3,000 driving and 2,000 pony wheel tires at a price of 19s. 4d. for each driving, and 16s. 7d. for each pony wheel. The company proposed to sub-let the manufacture of the tires to certain German firms. Having regard to the outbreak of war, the Highways Committee have made arrangements for tires to be purchased as follows:

Henry Bessemer and Company, Limited—3,000 driving wheel tires at £1 3s. each, and 2,000 pony wheel tires at £1 each.

Cammell, Laird, and Company, Limited—500 driving wheel tires at 22s. each, and 500 pony wheel tires at 19s. each.

METALLIC FILAMENT TRACTION LAMPS.

The tender of Siemens Brothers Dynamo Works for the supply of 125,000 metallic filament traction lamps at £6,313 2s. 6d. has been accepted. Tenders were received from the following selected firms: Siemens Brothers Dynamo Works, Limited, Edison and Swan United Electric Light Company, Limited, the Electrical Company, Limited, and the General Electric Company, Limited.

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DICK, KERR AND COMPANY, LIMITED.

THE WAR AND BUSINESS PROSPECTS.

The ordinary general meeting of the shareholders of Dick, Kerr and Company, Limited, was held on October 15 in Cannon Street Hotel, London, E.C., Mr. Claude T. Cayley, chairman of the board, presiding.

The CHAIRMAN, in moving the adoption of the directors' report and accounts for the year ended June 30 last (an abstract of which is appended to this report), said that the board were very pleased to have so satisfactory a statement to submit. There had been a great increase in the profit earning of the company. Two years ago the profit was down to about £3,000. Next year it rose to £30,000, and now it was up to nearly £45,000. The directors and the staff would do all in their power to maintain the progress. In regard to the accounts, it was satisfactory to see that the item "capital expenditure at the works, including goodwill and patents," showed a reduction of about £14,000, the depreciation having been maintained as in previous years. This reduction indicated that less expenditure than usual had been incurred in extensions to plant. The sum representing the value of the "stocks in hand and work in progress" showed a slight increase over what was already last year considered a high-water mark, and it was gratifying to know that they started the present financial year with a considerable amount of orders in hand. On the other side of the balance sheet he would mention the elimination of the item shown last year as "loan from bankers," the directors having taken an opportunity of obtaining the necessary financial accommodation in another way.

No doubt the shareholders were anxious to know what the prospects for the immediate future and what permanent effects were to be anticipated as the result of the war. Intelligently to understand the position, it was necessary to emphasise the ramifications of the company's business. Most people to-day considered Dick, Kerr and Company as being solely an electrical manufacturing concern, but those who had been shareholders since the earlier days of the company would recollect that at one time they were primarily a contracting firm, and that it was only some 15 years ago that they found it necessary to become manufacturers of electrical apparatus so as to enable them to carry out advantageously the large contracts then in hand for tramway construction. As the importance of the contracting department declined with the diminution of the demand for new tramway construction, the manufacturing department increased in importance. Owing to the policy adopted some years ago of extending the contracting department in other directions, they had reached a condition of having two distinct sections, approximately equal in importance, which in future could be expected materially to assist each other. As instances of the class of work dealt with by the contracting department, he mentioned the construction of a railway 90 kilometres in length for the Government of Portuguese East Africa, which had just been completed, and a contract lately entered into with the Metropolitan Water Board for the construction of a very large reservoir representing some six years' work. In the other section, the electrical manufacturing department, he instanced the contracts now in hand with the London and South Western Railway Company for the complete equipment of the generating station for the supply of current for their suburban electrification scheme, and with the Lancashire and Yorkshire Railway Company for the supply of the machinery and apparatus for the complete electrification of their Manchester suburban lines. These two sections represented the main business of the company. But there was a third department, namely, the general supply, or the merchant business. This department was chiefly concerned with the supply to customers of such general engineering machinery and electrical supplies as the company manufactured, and also such as their experience of this class of work enables them to obtain from other sources to the advantage and satisfaction of their clients.

He had entered into these details for the purpose of explaining that their ramifications were such that while, undoubtedly, some departments would be detrimentally affected by the war, others might be expected to derive certain advantages. It was to be assumed that for some time the construction of public works would be deferred, but as far as their contracting department was concerned, the Metropolitan Water Board contract would fill the breach to some extent. Concerning the prospects of British manufacturers of electrical machinery, much was being said in the public Press regarding the benefits to be reaped owing to the removal of German competition, but it must be borne in mind that the elimination of Germany as a competitor did not necessarily signify the entire absence of competition. It appeared to him that to whatever extent Germany might be crippled financially for the time being, she would make stupendous efforts to regain her lost markets. The German manufacturers possessed the advantage of having their home markets to themselves, and with their home demand as a profitable nucleus, they were enabled to compete for business abroad on a more favourable basis than could the manufacturers of a country where it had to be all grist that comes to their mill. But another factor of no less importance was the financial assistance which German manufacturers had been receiving from their banking institutions. What an immense advantage such assistance denoted could only be fully realised by those directly connected with the management of manufactories turning out large and expensive classes of machinery, where the acceptance of an order of any size involved the locking up of capital from the time the raw and half-finished material was purchased till the machines were completed and delivered, a period usually extending over many months. Hence it was surprising, but nevertheless gratifying, to find that British manufacturers had to some extent, at all events, been able to put up a fight, considering the limited resources at their disposal. Taking all the indications into consideration, the directors were of the opinion that the company would have to tide over a lean year or two before they could hope to see the dawn of an increased demand for the heavy class of machinery in which they specialised. In their merchant business they looked for, and indeed were already experiencing, an increased turnover. Certain classes of apparatus in which they had specialised were of the nature required for camp and transport equipment. As regarded their electrical supplies department, he might instance the steady growing demand for their metallic filament lamps, the sale of which had been greatly retarded in the past, due to keen Continental competition.

Summing up, therefore, while no one was in a position to prophesy what the future had in store, particularly at a time when Europe was in the throes of an upheaval such as the world had never before witnessed, he had no hesitation in saying that the company's organisation was such as to inspire confidence in its ability to hold its own, especially if the preference shareholders, at the meeting about to be held, would place the board in a position to take full advantage of future possibilities.

Mr. R. H. PRESTWICH, the deputy chairman, seconded the motion, and it was unanimously agreed to without discussion.

On the motion of Mr. Prestwich, the retiring directors—Mr. Cayley and Mr. Thomas D. Lingard—were re-elected. The auditors, Messrs. Gane, Jackson, Jefferys, and Freeman, were reappointed.

Mr. J. R. HOYLE moved, and Mr. E. J. FOX seconded, a vote of thanks to the chairman, the directors, and the staff. Mr. Fox remarked that this was more than a formal vote, as the company occupied the premier position in the country as electrical manufacturers.

The CHAIRMAN, in reply, paid a high tribute to the ability shown by the managing director, Mr. W. Rutherford. This is further referred to in the "Personal" column of this issue.

A meeting of the preference shareholders of the company was afterwards held—Mr. Cayley in the chair—to consider a resolution to sanction the creation and issue of debentures or debenture stock, the total in no case to be such as would bring the amount along with the first mortgage debenture stock up to more than £650,000.

The CHAIRMAN said that the new stock would be second debentures, and would be issued as and when the directors found there was a proper opportunity for doing so. It did not follow that the whole amount of second debentures, about £240,000, would be issued. Replying to questions, he said that the company had been fairly large borrowers from the bank, and by issuing debentures they would, instead of paying interest to the bank, pay it to the debenture holders. That would not affect to any extent the net result in the profit and loss account. Let them take, for instance, the contract with the Metropolitan Water Board, one of the largest contracts that the company had ever entered into. Money had to be found for that work. It was not yet settled what the rate of interest on the second debentures would be, but it would depend on the condition of affairs in England and Europe. Meantime, though they did not make the issue, it gave security to the bankers when the company borrowed money to carry on large and lucrative contracts.

The motion was adopted.

The directors' report, which was adopted by the general meeting, shows a notable improvement on the results of the previous year, as will be seen from the summary set out below:

	1914.	1913.	1912.
	£	£	£
Net profits	44,761	30,092	3,275
Balance from last year	10,325	10,016	36,892
	£55,086	£40,108	£40,167
	£	£	£
Debenture interest and trustees' fees	10,961	11,183	11,551
Reserve for premium on deb. stock redeemed	300	300	300
Year's dividend on 6 per cent. pref. shares	18,300	18,300	18,300
Balance	25,525	10,325	10,016

Although there is a balance of £25,525 after paying the dividend on the preference stock, the directors do not recommend the payment of any dividend on the ordinary shares. In view of possible contingencies resulting from the war a material reduction in the value of investments is anticipated, but the directors propose to utilise the reserve of £150,000 for adjustment of values when the permanent depreciation can be assessed. The company's cash resources have been diminished by the redemption of existing debentures to the extent of nearly £70,000, and

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at the same time the demand for additional working capital increases with the expansion of the manufacturing department of the business. The preference shareholders will consequently be asked to sanction additional debenture stock. The issue of the additional debentures will not necessarily mean that there will be any new interest charge incurred, as temporary accommodation has hitherto been obtained from the bankers from time to time.

FINANCIAL REPORTS AND MEETINGS.

Babcock and Wilcox, Limited.—An interim dividend of 5 per cent. has been announced on the ordinary shares.

Lisbon Electric Tramways Company.—Interim dividend of 3 per cent., free of tax, has been declared on the ordinary shares.

The Brazilian Traction, Light, and Power Company, Limited, announce the usual quarterly dividend of 1½ per cent. on the ordinary shares.

Calcutta Tramways Company.—The directors have declared an interim dividend at the rate of 6 per cent. per annum on the ordinary shares for past half-year.

Sao Paulo Tramway, Light, and Power Company.—A dividend of 2½ per cent. on the capital stock, will be paid on November 2. A year ago the dividend was at the same rate.

Val de Travers Asphalte Paving Company.—The directors have declared an interim dividend of 6d. per share for the half-year ended June 30, being at the rate of 5 per cent. per annum. This is the same rate as was paid a year ago.

La Plata Electric Tramways.—The accounts for the half-year ended June 30 last show a surplus of £5,212 after providing for debenture interest, but the board have decided not to pay an interim dividend on the preference shares.

Brisbane Electric Tramways Investment Company.—The directors have decided to postpone the payment of the final call of £2 on the ordinary shares from October 15 to November 16. The usual interim dividend of 4s. per share on the ordinary shares will be paid on December 1.

Norwich Electric Tramways Company report a profit for the year ended June 30 of £11,076, and including £141 brought forward there is an available balance of £11,217. The directors propose to place £2,500 to the reserve fund account, and to pay a dividend of 3 per cent., requiring £7,920, leaving £797 to be carried forward.

South Western Railway Electrification.—The issue of £1,000,000 5 per cent. redeemable 10-year terminal bonds of the London and South Western Railway, which was offered at 99¾ per cent, was very largely over-subscribed. The issue, it will be remembered, is in connection with the electrification of the suburban lines of the company, which is now in progress.

Leeds City Tramways.—The half-yearly statement of income and expenditure presented to Leeds Tramways Committee on October 19 by Mr. J. B. Hamilton, the general manager, shows a net surplus of £45,465. The receipts, which amounted to £224,185, showed an increase of £1,343, compared with the corresponding period of last year, and the number of passengers was 48,543,198, against 47,996,569.

Parana Tramways Company, Limited, was registered on September 24 with a capital of £75,000 in £1 shares, with the object of acquiring and working tramways and railways, or to purchase and supply electricity for lighting, heating, motor power and traction, and to enter into an agreement with J. G. White and Company, Limited. The solicitors are Messrs. Julius, Edwards, and Thomas, of 8, Old Jewry, E.C.

Hurst, Nelson, and Company.—The directors have had before them the draft accounts for the year ended July 18, and, subject to completion of the audit, the results are such as will enable the board, after setting aside the amounts required for the dividend on the preference shares payable in November and May next, and placing a substantial sum to reserve, to recommend a dividend of 5 per cent. on the ordinary shares. A year ago 2½ per cent. was paid on the ordinary shares.

Belfast Tramways Half-Year.—It is reported that the total receipts for the six months from April 1 to September 30 amounted to £141,620, an increase of £4,108 over the same period of 1913, and that the profit on working for the past half-year is £60,854, or £3,000 more than in the summer half of 1913-14, while the surplus profit for the six months is £15,239, an increase of over £3,000 on last year's summer half. After deducting allowance for depreciation, it is estimated that the available profit for the six months is more than £6,000.

Auckland Electric Tramways.—The directors have declared a final dividend of 1s. per share, free of income tax, on the ordinary shares, making 1s. 7d. per share for the past year, placing £22,500 to renewals and depreciation account, and £10,000 to reserve (making that fund £112,500), and carrying £5,876 forward. Mr. Tegetmeier, presiding at the annual meeting of shareholders in London on October 22, said that with the complete collapse of the strike and the defeat of the federation of labour they could look forward to industrial peace in New Zealand for some time to come. For the first two months of the war the receipts had gone up by over £4,000. The report was adopted.

Liverpool Tramways Increasing Revenue.—Alderman Fred. Smith, replying to a vote of thanks accorded to him for his year's service as chairman of the Liverpool Tramways and Electric Power and Lighting Committee, at a meeting on October 21, said that the first nine months of the present year had provided a record over all previous years as regards the total receipts and the number of passengers carried. In 1914 the receipts for the first nine months were £517,240, against £505,016 in the corresponding period of 1913. The passengers carried numbered 109,902,170, against 107,457,935 last year. The mileage run was 10,455,543, against 10,034,045. The earnings per car-mile in 1914 were 11·87d., against 12·07d. in 1913. A vote of thanks was also passed to Major Clarke, the deputy-chairman of the committee.

B.E.T. Capital Reduction Scheme Deferred.—Early in July particulars were published of a scheme for the reduction of the capital of the British Electric Traction Company, Limited. The directors recently issued a statement to the effect that stockholders, having been asked to state before October 1 whether or not they were in favour of the directors' proposals, 1,589 replies were received before August 4 last, and 348 have been received since. The replies show that a large majority of each class of stockholder and of the income certificate holders who have expressed their views are in favour of the scheme. The directors are of opinion that but for the intervening state of war a much larger number of replies would have been received, which probably would have increased the majority in favour of their proposals. Under the existing conditions, however, the directors consider that the wisest course is to defer any further action in regard to the scheme for the present.

Mexico Tramways Company.—The report for the year 1913 states that the net revenue from operation amounted to 3,164,756 pesos, as compared with 3,018,950 pesos for the year 1912. This revenue, converted into Canadian currency at the average monthly rate of exchange, gave a profit from operation of $1,340,557 gold, to which has been added the income from securities and other sources—namely, $1,391,650—and the credit balance of $1,462,928 brought forward, making a total credit on profit and loss account of $4,195,136. Out of this sum have been paid the current expenses and fixed charges, amounting to $1,473,419, and dividends aggregating 7 per cent. on the share capital, leaving a credit on profit and loss account of $1,382,967, which has been carried forward. Since January 1st, 1914, the board has considered it advisable, owing to the continued state of political unrest in Mexico and the consequent heavy fall in exchange, to defer for the present the payment of further dividends on the share capital.

Wellington (N.Z.) Tramways.—The annual report of Wellington (New Zealand) Corporation Tramways for the year ended March 31 last shows that the total revenue was £160,347, being an increase of £8,508 compared with the previous year. The working expenses were £105,613, an increase of £4,484. After paying interest, sinking fund, and allowance of £14,682 for depreciation, there remained a net surplus of £15,430, being an increase of £3,527. The percentage of working expenses to total revenue was 65·86 compared with 66·6, and the ratio of net surplus to capital outlay was 2·45 per cent. against 1·96 per cent. The total revenue per car-mile was 16·52d. against 15·81d. in the previous year, while the working expenses per car-mile were 10·88d. against 10·53d. The capital charges per car-mile amounted to 4·05d., so that the total expenses were 14·93d. The number of passengers was 24,565,376, being an increase of 706,964. The arrangement of fares seems to be an interesting one, as the average fares per mile are given as follow: Ordinary cash fares, ·89d.; concession tickets, ·6d.; workers' tickets, ·44d.; scholars' tickets, ·19d. In view of increasing traffic various extensions of the lines are proposed.

Ayr Corporation Tramways.—The annual report for the year ending May 15, 1914, issued by the general manager, Mr. William Grant, shows a considerable increase in the traffic receipts. The total revenue for the year amounted to £19,377, an increase of £3,082, while the working expenses were £10,662, leaving a balance of £8,715, which was sufficient to provide for repayment of sinking fund and interest, leaving £2,502 to be placed to the depreciation account and £1,141 to the reserve fund. In view of the fact that the results have been achieved in the face of keen competition by motor char-a bancs, the result is all the more satisfactory. Receipts per car-mile work out at 10·45d., and working expenses were 5·75d. per car-mile, the ratio of working expenses to receipts being 55 per cent. The consumption of electrical energy has been reduced to ·94 units per car-mile, a very low figure. During the past year two new cars were ordered from Messrs. Hurst, Nelson, and Company. After some respite from corrugations, the manager remarks that these have again appeared on the rails. The worst of them were ground out during the past winter, and the work will require to be again undertaken in the following winter.

(*Continued on page 345.*)

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

TABLE I.—TOWNS WITH COMBINED GENERATING STATION FOR TRACTION AND LIGHTING PURPOSES.

Name.	Year Ended.	Electric Traction Inaugurated.	System.	Line open (single track). Mls. Chs.	Borrowing Powers.	Borrowing Powers Exercised.	Unexhausted Borrowing Powers.	Total Capital Expenditure.	Capital Expenditure per Mile of Single Track.	Loans Outstanding.	Loans Repaid and Sinking Fund.	Depreciation, Renewal and Reserve Funds.	Gross Receipts. Traffic.	Other.	Total.
Aberdeen	* May 31, 1914	Dec., 1899	E.	27 72	415,000	357,191	57,809	357,191	12,802	186,885	246,163	169,987	84,276	991	85,267
Accrington	* Mar. 31, 1914	Aug., 1907	,,	10 53	181,925	133,875	48,050	134,734	12,636	113,870	20,864	16,581	29,843	350	30,193
Ashton-u-Lyne	* Mar. 25, 1914	Aug., 1902	...	8 15	130,070	109,814	20,256	109,814	13,412	73,958	32,270	2,950	23,341	677	24,019
Ayr	* May 15, 1914	Sept., 1901	,,	9 30	...	...	...	100,841	10,756	79,171	19,460	16,489	18,315	1,062	19,377
Birmingham	* Mar. 31, 1914	Jan., 1904	,,	114 44	2,577,611	2,352,104	225,507	2,334,437	20,379	1,913,559	438,545	186,154	628,016	7,455	635,471
Blackburn	* Mar. 25, 1914	Mar., 1899	,,	24 63	408,174	342,474	65,700	335,735	13,544	248,578	182,557	2,146	68,192	3,147	71,339
Blackpool	* Mar. 31, 1914	June, 1899	,,	(p)21 33	453,798	310,994	142,804	310,994	14,524	310,994	126,036	21,660	84,034	763	84,797
Bolton	* Mar. 31, 1914	Dec., 1899	,,	47 19	551,092	551,092	...	566,395	11,961	399,417	178,850	50,819	142,504	1,270	143,774
Bradford	* Mar. 31, 1914	July, 1898	,,	(h)106 29	1,280,788	1,061,113	219,675	1,040,118	9,779	653,504	420,844	82,898	298,525	18,608	317,133
Brighton	* Mar. 31, 1914	Nov., 1901	,,	17 15	378,093	277,905	100,188	278,467	16,202	219,972	62,273	5,841	54,600	2,238	56,838
Burnley	* Mar. 31, 1914	Dec., 1901	,,	22 18	388,052	325,999	62,053	232,501	10,461	179,136	64,381	39,684	88,050	266	88,316
Burton-on-Trent	* Mar. 31, 1914	Aug., 1903	,,	10 50	108,632	104,562	4,070	106,275	10,121	49,239	55,323	10,134	15,010	1,497	16,507
Bury	* Mar. 31, 1914	June, 1903	,,	21 2 (b)13 21	407,800	281,745	123,055	286,989	13,650	255,455	49,013	(l)29,518	69,745	335	70,080
Chester	* Mar. 25, 1914	April, 1903	,,	6 35	92,991	82,380	10,611	82,934	12,883	68,477	14,121	4,282	12,793	480	13,273
Chesterfield	* Mar. 31, 1914	Dec., 1904	,,	5 8	98,000	73,500	24,500	69,810	13,663	57,660	13,820	6,307	13,608	465	14,073
Colchester	* Mar. 31, 1914	July, 1904	,,	7 75	70,748	69,555	1,193	69,401	8,743	50,816	19,483	Nil.	10,390	509	10,899
Croydon	* Mar. 31, 1914	(q) Sept., 1901	,,	17 50	287,689	287,689	Nil	284,847	16,162	229,300	96,719	42,352	84,926	2,100	87,026
Darlington	* Mar. 31, 1914	June, 1904	,,	8 71	107,500	77,832	29,668	77,786	8,752	56,178	23,338	6,806	12,976	261	13,237
Darwen	* Mar. 31, 1914	Oct., 1900	,,	7 13	93,400	86,300	7,100	85,831	11,984	55,090	30,892	8,500	15,631	1,003	16,634
Derby	* Mar. 31, 1914	July, 1904	E. H.	22 20	... ...	... ...	... ...	245,332 ...	11,026 ...	177,676 ...	67,656 ...	(l)32,356 ...	E51,126 H 429	1,048 19	52,174 448
Doncaster	Mar. 31, 1913	June, 1902	E.	12 42	...	...	...	99,172	7,918	80,400	14,741	780	19,928	334	20,262
Dundee	* May 15, 1914	July, 1900	,,	28 32	(f)	354,783	...	362,116	12,751	264,720	90,062	82,966	67,754	1,750	69,504
East Ham	* Mar. 31, 1914	June, 1901	,,	14 5	190,643	190,242	401	191,654	13,127	140,457	65,478	3,453	54,079	836	54,915
Exeter	* Mar. 31, 1914	April, 1905	,,	7 0	106,000	86,111	19,889	86,111	12,301	67,354	19,249	6,290	17,489	97	17,586
Gloucester	* Mar 31, 1914	April, 1904	,,	15 1	191,000	144,333	46,667	147,783	9,846	107,275	20,592	1,000	16,829	1,188	18,017
Halifax	* Mar. 31, 1914	June, 1898	,,	55 39	449,263	417,466	31,797	419,335	7,557	297,327	119,433	31,745	108,617	1,033	109,650
Ilford	Mar. 31, 1913	Mar., 1903	,,	11 28	149,633	149,633	Nil	149,500	13,171	109,912	39,721	5,611	24,361	2,407	26,768
Ilkeston	Mar. 31, 1913	May, 1903	,,	3 60	64,214	47,000	17,214	47,883	12,769	42,500	13,660	Nil	6,006	58	6,064
Ipswich	* Mar. 31, 1914	Nov., 1903	,,	14 70	116,471	114,300	2,171	115,676	7,776	96,912	18,447	11,994	22,964	862	23,826
Keighley	Mar. 31, 1913	Oct., 1904	,,	6 9	50,934	47,328	3,606	47,328	7,745	32,468	16,961	942	8,845	313	9,158
Kilmarnock	May 15, 1913	Dec., 1904	,,	5 47	65,000	52,625	12,375	53,191	9,519	44,766	7,379	4,017	8,543	248	8,791
Kirkcaldy	* May 15, 1914	Feb., 1903	,,	8 65	213,000	96,749	116,251	96,749	10,979	77,868	18,881	4,687	17,506	443	17,949
Lancaster	* Mar. 31, 1914	Jan., 1903	,,	4 65	...	45,700	...	43,684	9,077	30,450	15,350	3,074	5,779	158	5,937
Leith	* May 15, 1914	Aug., 1905	,,	17 73	275,000	238,000	37,000	236,877	13,211	179,350	58,650	3,045	36,555	1,170	37,725
Leyton	* Mar. 31, 1914	Dec., 1906	,,	18 8	324,201	324,145	56	295,376	16,319	240,741	57,244	2,654	69,148	1,541	70,689
Lincoln	* Mar. 31, 1914	Nov., 1905	S.	2 77	98,519	44,947	53,572	44,987	15,185	41,579	11,176	(l) 1,100	6,971	130	7,101
Liverpool	Dec. 31, 1913	Nov., 1898	E.	119 0	...	...	...	2,024,706	17,014	1,177,384	1,091,771	428,318	677,881	13,018	690,899
Lowestoft	Sep. 30, 1913	July, 1903	,,	4 6	96,230	89,912	6,318	89,912	22,064	76,283	15,231	...	11,365	296	11,661
Maidstone	* Mar. 31, 1914	July, 1904	,,	7 3	82,932	82,932	...	79,098	11,239	65,574	17,358	...	10,391	575	10,966
Manchester	* Mar. 31, 1914	June, 1901	,,	202 48	2,358,606	2,117,411	141,195	2,130,904	10,518	1,616,131	491,410	478,381	911,223	14,087	925,310
Nelson	* Mar. 31, 1914	Feb., 1903	,,	3 69	38,000	37,885	115	37,885	9,808	29,145	8,740	...	10,801	52	10,853
Newport (Mon.)	* Mar. 31, 1914	April, 1903	,,	14 28	219,250	196,250	23,000	194,983	13,588	153,734	45,350	4,055	40,151	1,039	41,190
Nottingham	* Mar. 31, 1914	Jan., 1901	,,	...	...	...	...	667,705	...	410,091	237,501	68,372	172,731	2,648	175,379
Oldham	* Mar. 25, 1914	May, 1902	,,	28 6 (b) 8 31	509,723	442,047	67,676	444,565	15,835	311,148	133,167	8,455	114,481	1,689	116,170
Perth	May 15, 1913	Nov., 1905	,,	6 60	90,000	78,350	11,650	78,629	11,649	63,340	15,489	1,673	8,761	509	9,270
Plymouth	Mar. 31, 1913	Sept., 1899	,,	15 0	...	189,512	...	219,417	14,628	90,925	37,826	17,550	37,925	1,123	39,048
Pontypridd	Mar. 31, 1913	Mar., 1905	,,	8 48	136,019	135,919	100	137,148	15,946	109,757	26,052	Nil	21,580	313	21,893
Rawtenstall	* Mar. 31, 1914	May, 1909	,,	15 71	193,290	182,168	11,122	182,273	11,473	156,813	25,355	3,870	26,873	369	27,242
Rochdale	* Mar. 31, 1914	May, 1902	,,	(i) 40 2	356,991	347,782	9,209	353,066	16,020	347,782	95,573	11,000	82,878	298	83,176
Rotherham	* Mar. 31, 1914	Jan., 1903	,, R.T	12 2 ...	...	183,775 ...	...	184,859 ...	14,537 ...	152,244 ...	33,481 ...	24,632 ...	44,495 5,757	70 ...	44,565 5,767
Salford	* Mar. 31, 1914	Oct., 1901	E.	75 64	1,050,666	724,469	326,197	723,923	9,554	532,821	191,648	28,492	272,758	54	272,812
Southampton	* Mar. 31, 1914	Jan., 1900	,,	18 54	277,241	261,219	16,022	258,299	13,831	164,454	89,483	13,433	67,672	2,926	70,598
Southend-on-Sea	Mar. 31, 1913	July, 1901	,,	11 49	130,000	129,961	39	143,808	12,384	116,940	12,784	3,045	34,453	465	34,918
Southport	* Mar. 31, 1914	July, 1900	,,	(d) 10 63	294,000	197,730	94,270	196,178	9,921	150,250	47,480	442	18,391	455	18,846
South Shields	* Mar. 31, 1914	Mar., 1906	,,	10 21	251,882	175,056	76,826	173,599	16,916	146,912	33,413	(l)26,881	37,744	586	38,330
Staly'ge, H., M., D.	* Mar. 31, 1914	May, 1904	,,	27 57	325,270	274,990	44,280	279,778	10,096	217,173	63,817	811	40,333	292	40,625
Stockport	Mar. 31, 1913	Aug., 1901	,,	27 5	305,028	217,804	87,224	251,508	9,145	167,300	67,199	33,552	n,62,979	1,198	64,178
Sunderland	* Mar. 31, 1914	Aug., 1900	,,	20 28	308,699	303,211	5,488	305,493	15,012	172,370	121,890	39,508	74,861	365	75,226
Wallasey	* Mar. 31, 1914	Mar., 1902	,,	19 77	198,867	195,290	3,577	216,498	10,848	161,934	64,221	9,520	63,151	562	63,713
Walsall	Dec. 31, 1913	Dec., 1902	,,	19 44	188,145	188,100	45	183,351	9,378	159,561	58,366	33,873	32,991	682	33,673
Walthamstow	* Mar 31, 1914	June, 1905	,,	13 30	198,000	194,000	4 000	188,192	14,070	171,716	21,781	1,940	38,590	718	39,308
Warrington	* Mar. 31, 1914	April, 1902	,,	9 52	103,674	102,896	778	102,128	10,583	70,476	32,422	10,000	23,232	521	23,753
West Ham	* Mar. 31, 1914	Feb., 1904	,,	30 4	563,478	551,588	11,890	556,878	18,532	527,934	104,716	32,740	142,034	3,155	145,189
Wigan	* Mar. 31, 1914	April, 1901	,,	30 73	500,955	483,757	17,198	473,906	15,349	392,118	142,815	804	77,973	1,375	79,348
Wolverhampton	* Mar. 31, 1914	April, 1902	S.	21 40	279,733	268,185	11,548	287,569	13,378	215,166	61,351	54,864	56,444	759	57,203
Yarmouth (Gt.)	* Mar. 31, 1914	June, 1902	E.	14 58	149,600	124,750	24,850	126,363	9,207	116,450	25,996	9,075	25,712	527	26,239
York	* Mar. 31, 1914	Jan., 1910	,,	12 20	157,150	157,150	340	156,810	12,853	152,470	6,323	5,092	26,133	642	26,775

TABLE II.—TOWNS WITH SEPARATE GENERATING STATIONS FOR TRACTION.

Belfast	* Mar. 31, 1914	Nov., 1905	E.	98 54	1,528,146	1,381,200	146,946	1,440,959	14,565	1,343,000	224,840	97,783	268,250	3,812	272,062
Bexley	Mar. 31, 1913	Oct., 1903	,,	6 42	99,942	97,387	2,555	96,927	14,912	76,492	20,895	959	13,654	(o)1,542	15,196
Birkenhead	* Mar. 31, 1914	Feb., 1901	,,	24 7	376,398	369,528	6,870	371,097	15,406	239,201	130,267	22,655	67,725	4,300	72,025
Bournemouth	* Mar. 31, 1914	July, 1902	,,	(e) 29 62	432,440	...	...	443,006	19,821	286,385	146,054	18,409	104,353	616	104,969
Cardiff	* Mar. 31, 1914	May, 1902	,,	31 66	830,382	787,292	43,090	786,510	24,714	514,059	273,232	104,002	141,519	24,681	166,200
Coventry	* Mar. 31, 1914	Jan., 1912	,,	15 61	251,014	235,574	15,440	229,197	14,541	230,596	8,517	3,983	42,751	733	43,484
Glasgow	* May 31, 1914	Oct., 1898	,,	193 40 (b) 2 53	3,714,266	3,694,143	20,123	3,675,317	19,023	2,517,360	1,176,783	2,196,808	1,078,691	5,156	1,083,847
Huddersfield	* Mar. 31, 1914	Feb., 1901	,,	48 41	772,662	407,142	365,520	458,878	9,460	239,984	176,542	30,974	112,660	3,660	116,320
Hull	* Mar. 31, 1914	July, 1899	,,	33 12	645,073	565,998	79,075	566,754	17,096	552,191	164,991	137,060	165,892	1,074	166,966
Leeds	* Mar. 31, 1914	Aug., 1897	,,	114 5	1,701,455	1,626,422	75,033	1,571,196	14,384	1,286,916	534,631	4,801	423,516	3,939	427,455
Leicester	Dec. 31, 1913	May, 1904	,,	37 0	929,120	727,405	201,715	739,982	19,999	602,478	129,807	100,000	147,458	17,059	164,517
London	* Mar. 31, 1914	...	H.	13 73	...	...	...	...	...	...	...	...	21,145	480	21,635
		May, 1903	C.E	277 26	(c)	(c)	(c)	13,028,119	...	9,923,528	3,370,966	730,346	2,181,344	65,698	2,247,042
N'castle-on-Tyne	* Mar. 31, 1914	Dec., 1901	E.	62 72	1,522,010	1,277,747	244,263	1,284,380	20,428	929,766	428,119	94,337	251,024	10,177	261,201
Northampton	* Mar. 31, 1914	July, 1904	,,	9 16	239,800	127,255	112,545	126,431	13,742	87,022	40,501	11,834	28,527	812	29,339
Portsmouth	* Mar. 31, 1914	Sep., 1901	,,	34 51	708,618	708,618	...	772,684	22,308	449,206	259,413	75,054	115,168	1,823	116,991
Preston	Mar. 31, 1913	June, 1904	,,	17 16	224,102	187,270	36,832	187,269	10,888	119,790	42,091	36,841	42,964	306	43,270
Reading	* Mar. 31, 1914	July, 1903	,,	13 14	235,000	234,000	1,000	230,763	17,515	162,634	68,159	18,371	35,282	1,043	36,325
Sheffield	* Mar. 25, 1914	Sep., 1899	,,	79 3	1,640,371	1,426,217	214,154	1,521,439	19,250	1,073,612	463,575	30,378	386,114	3,562	389,676
Wellington, N.Z.	* Mar. 31, 1914	...	,,	31 55	496,423	496,423	...	628,151	19,821	496,423	46,836	120,191	157,096	1,161	158,257

C—Electric conduit system. E—Electric trolley system. H—Horse lines RT—Railless trolley system. S—Surface contact system.
(b) Additional lines leased and worked. (c) Conferred by Annual Money Act, which limits amount for each financial year. Powers not exercised are lapsed.
(d) Not including 8 m. 78 ch. leased lines. (e) Includes 7 mi. 34 chs. leased lines. (f) Unlimited. (h) Includes 1¼ miles railless trolley route. (i) 17 mi. 8 chn. single track leased.
(k) Not including 10 miles 3 chains single track lines leased. (l) Including Insurance. (n) Includes £114 trackless cars. (o) Includes £1,310 through-running contributions.
(p) Including leased lines. (q) Corporation working commenced June, 1906.

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

Specially Compiled for "The Tramway and Railway World."

TABLE I.—TOWNS WITH COMBINED GENERATING STATION FOR TRACTION AND LIGHTING PURPOSES.

Name.	Working Expenses.					Gross Profit on Working.	Additions to Gross Profit.	Deductions from Gross Profit.					Net Surplus + or Deficit −
	Traffic.	General.	Repairs & Maintenance.	Power.	Total.			Interest.	Sinking Fund.	Income Tax.	Depreciation & Renewal.	Sundries.	Total.	
Aberdeen	22,265	10,290	7,180	7,301	47,036	38,231	1,102	6,701	4,897	...	14,533	213	26,344	+ 12,989
Accrington	7,570	2,792	2,268	4,880	17,510	12,683	...	3,969	3,783	198	3,100	65	11,115	+ 1,568
Ashton-under-Lyne	5,149	1,682	3,053	3,372	13,256	10,763	...	2,590	3,760	477	800	39	7,666	+ 3,097
Ayr	4,206	2,033	1,905	2,457	10,661	8,716	...	(h) 2,558	1,744	164	2,503	606	7,575	+ 1,141
Birmingham	183,119	59,947	88,698	113,743	445,507	189,964	8,487	68,478	53,804	...	...	197	122,479	+ 75,972
Blackburn	17,263	4,947	14,659	10,301	47,170	24,169	...	4,803	15,176	179	...	...	20,158	+ 4,011
Blackpool	16,643	6,851	9,719	10,273	43,486	41,311	...	(h) 9,429	7,329	...	10,000	...	26,758	+ 14,553
Bolton	30,721	9,423	16,898	20,151	77,193	66,581	995	h) 11,230	17,387	1,239	18,357	1,446	49,659	+ 17,917
Bradford	92,305	29,243	58,991	50,611	231,150	85,983	3,877	20,443	31,822	3,888	11,454	5,053	72,660	+ 17,200
Brighton	14,691	4,716	14,420	8,613	42,440	14,398	122	7,895	5,783	...	...	...	13,678	+ 842
Burnley	23,284	7,571	11,998	20,096	62,949	25,367	...	6,939	7,728	1,072	...	(f) 1,941	17,680	+ 7,687
Burton-on-Trent	5,442	1,502	2,562	3,154	12,660	3,847	(q) 1,524	1,364	1,344	...	1,500	...	4,208	+ 1,163
Bury	15,735	5,416	7,011	7,684	35,846	34,234	151	7,904	4,895	462	3,124	(w) 12,000	28,385	+ 6,000
Chester	3,290	1,534	1,208	2,096	8,128	5,145	158	(h) 2,754	1,018	..	...	...	3,772	+ 1,531
Chesterfield	3,214	1,368	2,936	2,192	9,710	4,363	269	2,275	1,900	...	...	...	4,175	+ 457
Colchester	2,783	1,286	2,177	2,566	8,812	2,087	67	2,081	2,406	...	...	...	4,487	− 2,333
Croydon	29,938	6,976	14,626	18,203	69,743	17,283	664	7,943	7,415	1,227	...	1,132	17,717	+ 230
Darlington	4,305	812	1,995	2,012	9,124	4,113	101	(h) 1,944	1,996	102	469	...	4,511	− 297
Darwen	3,980	1,018	3,287	2,569	10,854	5,780	156	2,247	2,190	...	1,050	...	5,487	+ 449
Derby	E 17,320 H 540	2,906	5,499 81	8,610	34,335 621	17,839 def. 173	239	6,236	3,464	...	5,536	(l) 185	15,421	+ 2,657
Doncaster	4,364	1,156	4,698	3,561	13,779	6,483	84	2,876	1,737	...	664	...	5,277	+ 1,290
Dundee	17,495	5,964	9,477	10,502	43,438	26,066	...	8,742	6,400	211	9,701	...	25,054	+ 1,012
East Ham	18,739	6,802	12,067	10,521	48,129	6,786	...	(h) 5,570	6,882	...	...	573	13,025	− 6,239
Exeter	4,888	1,373	1,483	3,827	11,571	6,015	...	(h 2,305	1,885	101	...	...	4,291	+ 1,724
Gloucester	7,027	1,703	3,226	1,925	13,881	4,136	...	(h) 5,325	1,980	95	250	...	7,650	− 3,514
Halifax	29,239	7,803	15,805	20,426	73,273	36,377	...	10,288	11,617	...	56	773	22,734	+ 13,643
Ilford	9,482	2,424	4,116	4,279	20,301	6,467	557	4,894	4,146	...	...	...	9,040	− 2,016
Ilkeston	2,057	614	2,497	1,308	6,476	def. 412	524	1,748	1,694	..	...	(i) 412	3,854	− 3,330
Ipswich	8,538	2,250	5,578	3,522	19,888	3,938	...	(h) 3,624	2,142	...	...	...	5,766	− 1,828
Keighley	2,692	768	899	1,612	5,971	3,187	179	1,116	1,881	...	...	(m) 369	3,366	...
Kilmarnock	2,921	599	800	1,633	5,953	2,838	...	(h) 1,623	1,233	3	1,160	28	4,047	− 1,209
Kirkcaldy	4,942	1,424	2,007	3,081	11,454	6,495	...	2,656	2,355	...	410	233	5,654	+ 841
Lancaster	2,290	522	841	1,594	5,247	690	52	1,158	1,511	...	...	...	2,669	− 1,927
Leith	9,742	3,131	5,080	3,920	21,873	15,852	242	(h) 6,211	7,850	...	2,274	67	16,402	− 308
Leyton	(p) 22,360	8,611	13,711	12,923	57,605	13,084	133	10,007	8,461	...	...	202	18,670	− 5,453
Lincoln	1,473	644	973	960	4,050	3,051	402	1,529	1,071	...	...	...	2,600	+ 853
Liverpool	180,226	61,361	84,026	121,185	446,798	244,101	24,220	48,971	60,318	...	(d) 54,163	e) 4,869	168,321	+ 100,000
Lowestoft	3,320	743	1,579	2,685	8,327	3,334	..	h) 2,499	2,031	...	...	...	4,530	− 1,196
Maidstone	2,609	1,062	1,686	1,934	7,291	3,675	57	2,470	1,969	...	...	114	4,553	− 821
Manchester	276,663	89,420	89,649	129,492	585,224	340,086	13,594	(h) 55,729	54,599	9,418	97,219	33,625	250,590	+ 103,090
Nelson	2,537	684	1,525	2,123	6,869	3,984	...	978	1,026	...	...	...	2,004	+ 1,980
Newport (Mon.)	10,513	4,240	13,070	6,670	34,493	6,697	925	5,850	4,231	...	...	158	10,239	− 2,617
Nottingham	44,898	15,328	19,776	28,420	108,422	66,957	...	14,124	20,270	...	1,000	550	35,944	+ 31,013
Oldham	26,908	8,585	22,246	20,564	78,303	37,867	1,317	15,559	11,718	1,352	...	(g) 5,654	34,283	+ 4,901
Perth	3,182	698	418	1,252	5,550	3,720	50	1,523	1,632	3	612	...	3,770	...
Plymouth	8,031	4,161	4,322	7,905	24,419	14,629	1,257	4,793	3,932	...	4,465	...	13,190	+ 2,696
Pontypridd	5,017	1,395	5,476	3,196	15,084	6,809	1,754	(h) 4,009	4,160	...	...	39	8,208	+ 355
Rawtenstall	5,877	2,966	3,130	4,304	16,277	10,965	3,422	5,626	6,280	...	...	1,860	13,766	+ 621
Rochdale	18,788	5,167	9,525	10,949	44,429	38,747	1,397	11,485	9,594	1,020	...	(z) 9,555	31,654	+ 8,490
Rotherham	E 10,374 RT 1,310	3,084 409	7,888 1,434	9,918 658	31,264 3,811	13,301 1,946	209 31	5,008 400	3,465 568	...	...	...	8,473 968	+ 5,037 + 1,009
Salford	79,460	23,804	25,203	50,303	178,770	94,042	5,044	(h) 17,392	22,470	2,760	5,674	(k) 28,790	77,086	+ 22,000
Southampton	19,977	5,011	9,212	12,321	46,521	24,077	180	7,333	7,433	554	...	...	15,320	+ 8,937
Southend-on-Sea	8,046	2,260	3,534	6,187	20,027	14,891	4,228	(k) 3,834	1,753	...	4,017	..	9,605	+ 9,514
Southport	4,754	2,126	3,103	2,999	12,982	5,864	6,379	6,516	5,018	...	2,144	...	13,678	− 1,435
South Shields	8,838	3,715	3,633	6,399	22,585	15,745	265	(h) 5,333	3,570	...	...	...	8,903	+ 7,107
Staly'dge, H., M., D.	13,073	4,883	6,163	6,724	30,843	9,782	...	(h) 7,093	7,527	...	311	721	15,652	− 5,870
Stockport	13,876	3,520	6,852	5,929	30,179	33,998	1,197	5,639	8,701	1,053	2,698	5,602	23,696	+ 11,500
Sunderland	19,609	5 294	6,482	11,276	42,661	32,565	259	(h) 6,837	9,948	637	10,002	400	27,824	+ 5,000
Wallasey	17,686	4,792	6,512	11,500	40,490	23,223	92	5,603	4,885	...	...	634	11,122	+ 12,193
Walsall	8,019	3,201	4,678	5,710	21,608	12,065	1,371	5,191	3,439	458	1,868	...	10,956	+ 2,480
Walthamstow	14,821	3,234	7,416	8,568	34,039	5,269	301	(h) 6,396	3,265	...	3,645	...	13,306	− 7,736
Warrington	5,999	1,834	3,973	3,411	15,217	8,536	537	2,481	3,353	...	...	...	5,834	+ 3,239
West Ham	53,477	18,084	33,440	21,174	126,175	19,014	...	20,056	12,398	692	...	290	33,436	− 14,422
Wigan	16,604	5,226	11,643	11,016	44,489	34,859	308	14,197	12,561	...	...	(c) 3,719	30,477	+ 4,690
Wolverhampton	12,793	5,177	7,620	7,536	33,126	24,077	(x) 1,305	7,793	5,285	187	6,564	...	19,829	+ 5,553
Yarmouth (Gt.)	7,756	1,849	3,052	4,951	17,608	8,631	75	(h) 4,065	2,826	...	1,[illegible]15	...	8,706	...
York	8,713	2,028	1,936	5,259	17,936	8,839	...	(h) 4,609	1,706	...	...	...	6,315	+ 2,524

TABLE II.—TOWNS WITH SEPARATE GENERATING STATIONS FOR TRACTION.

Belfast	77,949	12,593	41,455	28,281	160,278	111,784	931	48,342	31,353	1,072	17,000	3,082	100,849	+ 11,866
Bexley	3,455	1,011	2,332	1,167	(s) 10,118	5,078	40	2,850	2,420	...	242	..	5,502	− 384
Birkenhead	17,015	5,374	11,759	10,744	44,892	27,133	83	(h) 11,577	9,499	373	5,712	55	27,216	...
Bournemouth	24,154	8,350	10,307	16,200	59,011	45,958	2,550	(a) 10,265	15,255	...	12,871	(e) 8,117	46,508	+ 2,000
Cardiff	44,037	11,121	18,146	26,260	99,564	66,636	2,592	23,941	23,014	2,835	6,946	...	56,736	+ 12,492
Coventry	12,861	4,471	7,945	3,833	29,116	14,368	478	8,506	5,230	...	277	414	14,427	+ 419
Glasgow	332,546	134,034	156,214	53,483	676,277	407,570	64,989	82,921	102,607	14,057	212,642	6,440	418,667	+ 53,892
Huddersfield	28,548	6,253	27,821	8,349	70,971	45,349	519	(h) 11,617	11,004	1,545	..	406	24,572	+ 21,296
Hull	50,216	14,935	41,885	11,803	118,869	48,097	879	16,953	12,954	1,425	3,374	...	34,706	+ 14,270
Leeds	113,819	41,144	41,020	30,399	226,382	201,073	8,354	44,961	53,914	5,344	31,576	3,627	139,422	+ 70,005
Leicester	54,257	10,405	21,566	23,887	110,115	54,402	3,763	23,541	12,453	2,122	7,636	2,413	48,165	+ 10,000
London	H 10 806 E 809,987	3,679 (r) 183,797	4,059 345,138	m) 11,671 246,328	30,215 1,585,251	def. 8,590 661,791	34,032	328,109	408,488	28,197	1,476	(t) 18,079	784,349	− 88,526
N'castle-on-Tyne	71,892	25,519	27,150	22,991	147,552	113,649	4,086	(h) 31,257	41,450	3,618	..	2,805	79,130	+ 38,605
Northampton	7,881	3,169	2,806	4,958	18,814	10,525	506	(h) 3,322	4,422	309	195	b) 1,083	9,331	+ 1,700
Portsmouth	31,669	11,041	8,901	6,009	57,620	59,371	(a) 12,203	21,593	18,263	1,302	11,714	...	52,872	+ 18,702
Preston	10,781	4,592	6,263	2,429	24,065	19,205	...	3,933	4,891	..	3,649	1,358	13,831	+ 5,374
Reading	8,635	3,661	4,086	3,597	19,979	16,346	...	6,716	5,062	149	...	...	11,927	+ 4,419
Sheffield	121,630	27,956	48,017	35,128	232,761	156,915	2,821	35,305	43,518	3,306	30,123	7,871	120,123	+ 39,613
Wellington, N.Z.	57,973	7,775	21,918	17,947	105,613	52,644	2,091	19,865	4,757	...	14,682	...	39,304	+ 15,431

(a) Includes £11,374 balance forward from previous year. (b) Includes £311 loss on omnibus account. (c) Includes £1,611 insurance fund.
(d) Includes reserve. (e) Includes rents for leased lines. (f) Rent of leased lines. (g) Rent of lines and deficit on motor omnibus account.
(h) Including income tax. (i) Loss on working. (k) Includes rents of lines. (l) Including loss on horse traction. (m) Horsing expenses.
(n) Transferred to motor omnibus capital account. (p) Includes £407 horse account. (r) Including special charges, £6,053.
(s) Includes £2,153 through-running contributions to L.C.C (w) Amount apportioned to leased lines. (x) Includes £365 profit on motor char-a-banc.
(z) Includes £6,519 rent of leased lines. ‡ £2,950 profit from 3 months' working.

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

Specially Compiled for "The Tramway and Railway World."

TABLE I.—TOWNS WITH COMBINED GENERATING STATION FOR TRACTION AND LIGHTING PURPOSES.

Name.	Appropriation of Net Surplus.			Receipts per Car Mile.		Operating Expenses per Car Mile.					Per-centage of Operating Expenses to Total Revenue.	Average Operating Expenses per Car Mile (excludi'g Power Cost).	Board of Trade Units.		
	Carried Forward.	Reserve.	Contribution to Rates or Municip'l Funds.	Average Total per Car Mile. d.	Average Traffic per Car Mile. d.	Traffic. d.	General. d.	Repairs and Maintenance. d.	Power. (Price paid) d.	Total. d.	%	d.	Units.	Cost per Unit. d.	Units used per car mile.
Aberdeen	...	12,989	...	11·17	11·04	2·916	1·348	·940	·956	6·16	55·16	5·415	2,170,033	·80	1·184
Accrington	...	...	1,568	12·64	12·49	3·17	1·18	·94	2·04	7·33	57·99	5·29	949,054	1·23	1·65
Ashton-u-Lyne	47	...	3,050	12·4197	12·0692	2·6622	·8695	1·5788	1·7434	6·8539	55·19	5·1105	640,413	1·25	1·38
Ayr	..	1,141	...	10·45	9·88	2·26	1·12	1·02	1·32	5·75	55	4·42	421,844	1·39	·94
Birmingham	...	31,000	44,972	10·689	10·564	3·080	1·009	1·492	1·913	7·494	70	5·581	24,257,823	1·125	1·70
Blackburn	4,011	...	...	14·08	13·46	3·41	·97	2·93	2·06	9·37	66·10	7·37	1,901,668	1·3	1 64
Blackpool	...	2,553	12,000	18·91	18·74	3·71	1·52	2·17	2·29	9·69	51·28	7·40	1,506,323	1·63	1·40
Bolton	417	...	17,500	11·944	11·838	2·552	·782	1·404	1·674	6·412	53·064	4·664	4,396,543	1·1	1·52
Bradford	...	...	17,200	12·166	11·486	3·204	1·051	2·173	1·948	8·376	73·138	6·428	12,041,279	1	1·924
Brighton	842	...	...	11·794	11·33	3·049	·978	2·992	1·787	8·806	74·66	7·02	1,722,548	1·2	1·49
Burnley	...	...	7,687	12·079	12·043	3·185	1·035	1·640	2·749	8·609	71·37	5·86	3,894,011	1·24	2·22
Burton-on-Trent	1,163	...	...	9·02	8·28	2·97	·82	1·40	1·72	6·91	76·7	5·08	545,672	1·39	1·08
Bury	...	(k)1,000	5,000	10·38	10·26	2·315	·769	1·213	1·252	5·549	50·44	4·297	2,037,620	1	1·252
Chester	...	1,531	...	9·17	8·84	2·27	1·06	·83	1·45	5·61	61	4·17	378,158	1·33	1·08
Chesterfield	...	457	...	11·1	10·8	2·54	1·08	2·31	1·73	7·66	68·9	5·93	420,824	1·25	1·38
Colchester	...	...	...	8·058	7·682	2·058	·95	1·61	1·897	6·515	80·36	4·618	410,555	1·5	1·26
Croydon	...	230	...	7·464	7·284	2·568	·599	1·254	1·561	5·982	79·53	4·42	2,874,462	1·522	1·027
Darlington	...	...	...	8·230	8·068	2·676	·505	1·241	1·251	5·673	68·93	4·422	482,791	1	1·25
Darwen	448	...	...	14·96	14·09	3·20	·92	2·96	2·31	9·39	65·25	7·08	469,939	1·312	1·77
Derby	(n) 75	...	...	E. 10·358	10·150	3·438	·577	1·092	1·709	6·816	65·8	5·107	1,425,112	1·45	1·179
				H. 6·077	5·821	7·325	...	1·039	...	8·424	138·6	...	...	...	...
Doncaster	...	1,290	...	9·41	9·25	2·03	·54	2·18	1·65	6·40	69·1	4·75	683,651	1·25	1·32
Dundee	...	12	1,000	12·018	11·716	3·026	1·031	1·639	1·815	7·511	62·49	5·696	2,520,470	1	1·815
East Ham	.	..	...	8·73	8·59	2·98	1·08	1·92	1·67	7·65	87·60	5·98	2,385,535	1·62	1·58
Exeter	...	1,724	...	9·456	9·404	2·628	·738	·797	2·059	6·222	65·8	4·163	565,247	1·625	1·27
Gloucester	...	...	...	6·77	6·32	2·64	·64	1·21	·72	5·21	77	4·49	481,967	1	·72
Halifax	1,818	5,792	6,033	11·738	11·627	3·130	·836	1·692	2·186	7·844	67	5·66	4,357,466	1·125	1·94
Ilford	..	...	...	7·616	7·464	2·698	·689	1·171	1·218	5·776	76·4	4·558	960,866	1·07	1·098
Ilkeston	...	...	...	6·727	6·661	2·281	·681	2·77	1·451	7·183	106·79	5·732	326,198	1	1·50
Ipswich	...	...	...	8·552	8·242	3·065	·807	2·002	1·265	7·139	83·47	5·874	676,189	1·25	1·011
Keighley	...	...	...	9·064	8·754	2·664	·761	·890	1·595	5·910	65	4·315	254,636	1·5	1·05
Kilmarnock	...	...	...	7·09	6·89	2·357	·482	·646	1·317	4·802	66·3	3·487	313,550	1·25	1·06
Kirkcaldy	341	...	500	9·162	8·936	2·522	·727	1·024	1·573	5·846	65·43	4·273	739,564	1	1·573
Lancaster	...	...	...	8·23	7·94	3·14	·71	1·16	2·19	7·20	88	5·02	225,094	1·7	1·29
Leith	...	...	...	9·54	9·24	2·46	·79	1·29	·99	5·53	57·98	4·54	939,737	1·001	·99
Leyton	...	...	...	9·355	9·151	(c) 2·959	1·140	1·815	1·710	7·624	81·338	5·914	3,043,900	1·019	1·678
Lincoln	853	...	...	10·36	10·17	2·15	·94	1·42	1·40	5·91	57	4·51	190,838	1·25	1·12
Liverpool	...	...	100,000	12·34	12·10	3·217	1·036	1·500	2·164	7·977	63·2	5·813	23,928,396	1·138	1·78
Lowestoft	...	..	...	8·5	8·3	2·50	·56	1·2	2·0	6·26	71·58	4·26	368,242	1·75	1·1
Maidstone	...	...	...	8·51	8·06	2·02	·81	1·34	1·48	5·65	70·07	4·17	371,290	1·25	1·2
Manchester	...	...	103,090	11·410	11·236	3·411	1·103	1·105	1·597	7·216	63·25	5·619	30,035,057	1·034	1·543
Nelson	1,980	...	...	12·85	12·78	3·00	·81	1·81	2·51	8·13	63	5·62	255,621	2	1·26
Newport (Mon.)	...	...	...	10·207	9·95	2·605	1·056	3·239	1·653	8·553	83·74	6·913	1,187,262	1·29	1·23
Nottingham	...	7,013	24,000	...	11·87	3·04	1·04	1·34	1·92	7·34	61·82	5·42	5,359,804	1·25	1·51
Oldham	...	4,901	...	13·422	13·228	3·109	·992	2·570	2·376	9·047	67·40	6·671	3,291,607	1·5	1·585
Perth	...	...	...	8·79	8·31	3·02	·66	·39	1·19	5·26	59	4·07	277,474	1·08	1·09
Plymouth	...	...	2,696	11·790	11·094	2·349	1·217	1·264	2·312	7·142	62·53	4·830	1,139,761	1·667	1·38
Pontypridd	355	...	...	12·16	11·99	2·78	·78	3·04	1·78	8·38	68·89	6·6	613,719	1·25	1·42
Rawtenstall	...	621	...	10·81	10·66	2·33	1·18	1·24	1·71	6·46	59·61	4·75	813,483	1·28	1·34
Rochdale	8,490	...	...	11·163	11·123	2·520	·692	1·307	1·556	6·075	53·4	4·519	2,610,994	1·006	1·546
Rotherham	E. ...	4,287	750	12·54	12·52	2·92	·87	2·22	2·79	8·80	70·15	6·01	1,731,184	1·375	2·03
	R.T ...	1,009	...	10·74	10·74	2·44	·76	2·68	1·23	7·11	66·20	5·88	120,303	1·375	1·07
Salford	...	...	22,000	10·501	10·499	3·059	·916	·970	1·936	6·881	65	4·945	9,812,392	1·23	1·606
Southampton	6,577	...	2,360	10·974	10·520	3·105	·779	1·432	1·915	7·231	66	5·316	2,004,408	1·5	1·29
Southend-on-Sea	2,514	1,000	6,000	13·14	12·97	3·03	·85	1·33	2·33	7·54	57·35	5·21	848,538	1·75	1·33
Southport	...	...	...	9·763	9·528	2·462	1·101	1·607	1·554	6·725	68·8	5·171	468,554	1·5	1·011
South Shields	(d) 500	4,907	1,700	10·244	10·087	2·362	·993	·971	1·710	6·036	58·92	4·326	1,105,203	1·388	1·231
Stalybridge, &c.	...	...	...	8·426	8·365	2·711	1·013	1·278	1·394	6·396	75·92	5·002	1,793,157	·9	1·549
Stockport	..	250	11,250	10·77	10·57	2·323	·592	1·152	·936	5·063	47·02	4·067	1,897,114	1·069	1·327
Sunderland	...	...	5,000	12·00	11·943	3·128	·844	1·034	1·799	6·805	56·97	5·0	1,804,219	1·5	1·19
Wallasey	1,443	3,000	7,750	11·844	11·739	3·287	·891	1·211	2·138	7·527	63·5	5·38	1,971,378	1·4	1·52
Walsall	1,480	...	1,000	11·234	11·007	2·675	1·068	1·561	1·905	7·209	64	5·304	845,654	1·68	1·176
Walthamstow	...	...	...	8·09	7·94	3·05	·66	1·53	1·76	7·00	86·6	5·24	1,495,460	1·375	1·28
Warrington	739	...	2,500	12·521	12·246	3·161	·966	2·036	1·798	8·021	68·273	6·223	545,817	1·5	1·199
West Ham	...	...	...	9·27	9·075	3·417	1·154	2·137	1·353	8·061	88	6·708	6,974,894	·75	1·85
Wigan	4,690	...	...	12·77	12·46	2·655	·836	1·862	1·761	7·11	56·07	5·35	2,216,740	1¼	1·476
Wolverhampton	...	...	5,553	11·485	11·333	2·569	1·039	1·530	1·513	6·651	57·9	5·138	1,845,821	1	1·542
Yarmouth (Gt.)	...	...	...	8·738	8·563	2·583	·616	1·016	1·649	5·864	68·48	4·215	758,296	1·56	1·052
York	..	2,524	...	9·08	8·86	2·95	·69	·66	1·78	6·08	67	4·30	1,009,827	1·25	1·43

TABLE II.—TOWNS WITH SEPARATE GENERATING STATIONS FOR TRACTION.

Name.	Appropriation of Net Surplus.			Receipts per Car Mile.		Operating Expenses per Car Mile.					Per-centage of Operating Expenses to Total Revenue.	Average Operating Expenses per Car Mile (excludi'g Power Cost).	Board of Trade Units.		
	Carried Forward.	Reserve.	Contribution to Rates or Municip'l Funds.	Average Total per Car Mile. d.	Average Traffic per Car Mile. d.	Traffic. d.	General. d.	Repairs and Maintenance. d.	Power.* (Price paid) d.	Total. d.	%	d.	Units.	Works Cost. d.	Units used per car mile.
Belfast	...	...	11,866	9·51	9·38	2·72	·44	1·46	·99	5·61	58·91	4·62	11,000,708	·617	1·37
Bexley	...	..	...	13·77	12·37	3·19	·73	2·20	1·1	7·22	66·6	6·12	405,140	1·1	1·52
Birkenhead	...	...	...	12·643	12·496	3·140	·991	2·170	1·336	7·637	60·33	6·30	2,672,599	·65	2·054
Bournemouth	...	2,000	...	12·83	12·76	2·95	1·02	1·26	(b) 1·99	7·22	56·21	5·23	3,245,277	·67	1·65
Cardiff	845	2,047	9,600	11·65	11·45	3·563	·900	1·468	·850	6·781	60	5·931	5,073,942	·488	1·71
Coventry	419	...	...	9·271	9·115	2·742	·953	1·694	·819	6·208	66·9	5·389	1,652,029	·544	1·47
Glasgow	...	...	53,892	10·659	10·609	3·271	1·318	1·536	·526	6·651	62·69	6·125	33,685,570	·378	1·38
Huddersfield	6,662	14,634	...	11·34	10·98	2·78	·61	2·72	·81	6·92	61·01	6·00	4,881,338	·42	1·94
Hull	...	7,270	7,000	9·47	9·41	2·85	·85	2·38	·67	6·75	71	6·02	5,710,219	·50	1·35
Leeds	...	...	70,005	11·145	11·042	2·967	1·073	1·070	·792	5·902	52·96	5·110	17,175,710	·493	1·801
Leicester	...	...	10,000	9·801	8·785	3·232	·620	1·285	1·423	6·560	66	5·137	7,141,333	·411	1·77
London	...	...	...	E. 9·21	8·94	3·32	·76	1·41	1·01	6·50	70·55	5·49	154,048,461	·601	2·63
				H. 8·15	7·97	4·07	1·39	1·53	4·40	11·39	139·72	11·39	...	...	...
N'castle-on-Tyne	...	25,135	13,470	11·709	11·253	3·222	1·144	1·217	1·031	6·614	54·96	5·583	10,231,454	·421	1·922
Northampton	..	1,200	500	10·69	10·39	2·87	1·15	1·03	1·80	6·85	64	5·05	966,282	1·23	1·47
Portsmouth	10,702	(i) 3,000	5,000	11·204	11·030	3·033	1·057	·852	·576	5·518	49·25	4·942	3,056,720	·521	1·103
Preston	...	5,374	...	10·698	10·50	2·665	1·135	1·550	·600	5·95	55·63	5·35	1,516,545	·384	1·309
Reading	...	2,529	1,890	9·261	8·996	2·201	·933	1·042	·917	5·093	55	4·18	1,170,173	·737	1·12
Sheffield	7,032	2,000	30,581	10·527	10·431	3·286	·755	1·298	·949	6·288	59·732	5·339	18,601,705	446	1·933
Wellington, N.Z.	15,431	...	...	16·309	16·189	5·974	·801	2·259	1·850	10·884	65·86	9·034	4,769,149	·906	2·05

* The figures given under "Power" in Table II. include actual works costs only. H—Horse lines. E—Electric trolley system. (b) Including current supplied by Bournemouth and Poole Supply Company. (c) Horse account ·0542d. (d) Accident, insurance, and compensation fund. (f) Insurance fund. (g) Including Insurance. (k) Insurance. (n) Remainder expended in paying capital expenditure not borrowed. (t) Amounts for 15 months.

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

Specially Compiled for "The Tramway and Railway World."

TABLE I.—TOWNS WITH COMBINED GENERATIHC STATION FOR TRACTION AND LIGHTINC PURPOSES.

Name.	Population Served.	Car Mileage.	Passengers Carried.	Passengers Carried per Car Mile.	Average Fare per Passenger.	Average Journeys per Head of Populat'n per Annum.	Average Car Miles per Day per Car.	Traffic Revenue per Mile of Single Track.	Average Traffic Revenue per Annum per Head of Populat'n Served.	Operating Expenses per Passenger.	Average Distance of 1d. Fare.	Average Fare Charged per Mile.	Average Speed per Hour.	Average Total Car Hours per Day.	Average Number of Cars in Use Daily.	Number of Cars in Stock.
	Traffic Records.															
					d.			£		*d.*	*Miles.*	*d.*	*Miles.*			
Aberdeen ...	165.000	1,832,587	22,218,142	12·11	·91	134·6	93	3,064	10·3	·508	1·80	·58	7·5	703	54	77
Accrington...	45.525	573.536	4,998.979	8·72	1·377	109·8	105	3.033	13·1	·84	1·07	·929	7·5	250	18	27
Ashton-u-L.	50.000	464.160	5.053,701	10·888	·648	173·09	106	2,851	9/4	·368	1·223	·81	8	190	12	25
Ayr	33.000	444,802	4,238,494	9·52	1·04	128	102	1,953	11/1	·606	1·25	·75	8	168	12	22
Birmingham	868.430	14,268,244	146.930,986	10·29	1·03	169	79·77	5,482	14 5	·904	2·	·427	7·87	10·16	500	550
Blackburn ...	200.000	1,149,462	12,731,532	11·07	1·28	63·15	105	2,751	6/10	·88	1·25	·76	7·5	448	32	61
Blackpool ...	67,500	1,075,943	14,289,802	13	1·41	211·7	86·7	4,524	24.9	·73	...	...	8	...	34	78
Bolton ...	221,000	2,888,930	32,019,574	11·08	1·062	144·88	122·85	3,032	13/-	·578	1·553	·633	7·25	1.030	73	112
Bradford ...	370,000	6,255,878	67,675,166	10·816	1·058	182	113	2,792	16/2	·819	1·67	·531	7·3	2.340·5	151	248
Brighton ...	133,096	1,156,584	11,839,515	10	1·11	88·95	83·36	3.176	8/2	·86	1·27	·788	6·41	544	34	50
Burnley ...	175,000	1,754,811	17,668,834	10·07	1·18	101	120	3,971	10/1	·85	1·25	·83	7	874	46	67
Burton ...	48.000	439,248	3,339,184	7·60	1·058	70	...	1.782	6 3	·91	1·505	·58	7·5	...	...	20
Bury	128,202	1,631,126	15,831,487	10	1·06	123·5	98·80	2,028	10 10	·543	1·24	·85	8·51	483·83	45·26	54
Chester ...	39.028	347,260	3,217,899	9·26	·95	82·45	95	1.987	6·7	·606	1·27	·8	7	150·6	10·04	18
Chesterfield	50,000	304,376	2,950,774	9·7	1·1	76	122	2,668	5 5	·78	1·38	·75	7·33	126	7	17
Colchester ...	44.700	324,622	1,757,794	6·58	1·42	47·84	89·6	1.309	4·8	1·20	·85	·96	6·78	142·27	9·88	18
Croydon ...	178,094	2,801,302	19,227,878	6·87	1·06	107·96	129	4,818	9.10	·871	2 05	·50	8·14	942·23	59	75
Darlington...	60,000	385,999	4,140,269	10·7	·752	69	96·1	1,460	4/4	·53	1·219	·45	6·66	151·25	11	18
Darwen ...	...	266,912	2,993,697	11·22	1·25	...	...	2,182	...	·88			...	...	...	...
Derby ...	124,000	E 1,208,880	12,136,148	10·039	1·011	97·88	..	2,398	8/3	·67	1·44	·75	6·375	...	...	50
		H. 17.710	110,231	6·224	·935			...		1·35	1	1	..	...	...	3
Doncaster ...	52.000	516,840	5,072,172	9·81	·952	97·54	103	1.591	7/8	·652	1·25	·76	7·5	218	16	25
Dundee ...	165,000	1,387,980	19,042,344	13·71	·853	115	...	2,387	8·2	·547	2	·50	7·3	...	...	68
East Ham ...	145,000	1,510,251	16,671,505	11·04	·78	115	150	3,704	7/1	·69	1·635	·634	7	216	32	45
Exeter ...	48,660	446,338	4,320,459	9·68	·97	88·8	82·125	2,498	7/2	·642	1·1	·902	5·76	228	16	20
Gloucester ...	53,972	638,646	4,415,555	6·9	·91	82	92·05	1,122	6/3	·75	1·5	·65	7·08	264·1	19	30
Halifax ...	176,000	2,242,086	20,276,077	9·04	1·26	115	80·21	1,958	12/4	·867	1·30	·87	7·23	853·93	77	101
Ilford ...	82,000	843,517	7,578,813	8·79	·831	92·42	...	2,312	5/1	·64	1·543	·69	8	...	..	26
Ilkeston ...	32,000	216,348	1,404,447	6·49	1·26	43·9	95	1,604	3·9	1·106	1·50	·633	7	93	7	13
Ipswich ...	75,681	668,650	5,715.035	8·54	·975	75·51	65·5	1,559	6/1	·84	1·53	·693	5·51	332·80	20·80	36
Keighley ...	43,000	242,500	3,099,272	12·8	·68	72·06	55·35	1,447	4.1	·462	2·22	·45	6·87	126	7	12
Kilmarnock	36,000	297,557	2,317,709	7·78	·879	64·38	90·05	1,537	4/8	·616	1·13	·86	7·22	112·58	9·05	14
Kirkcaldy ...	39,600	470,162	5,781,895	12·3	·726	146	52	1,989	8.10	·475	1·522	·64	7	183	17	22
Lancaster ...	41,786	174,752	1,603,321	9·17	·865	38·37	76	1,204	2/9	·785	1·71	·5	8	87·22	6·23	12
Leith ...	110,400	949,322	10,244,235	10·79	·86	92·8	125	2 031	6·8	·512	1·32	·72	8·3	314	21	37
Leyton ...	124,735	1,813,462	17,472,882	9·64	·950	140	120	1,820	11/1	·791	...	...	8·25	...	...	60
Lincoln ...	20,000	164,499	1,826,885	11·11	·907	91·34	65·7	2,350	6 11	·532	1·75	·428	7	90	5	8
Liverpool ...	839,000	13,442,605	144,085,927	10·72	1·129	172	77	5,695	16/2	·744	2·514	·39	7·5	4.920	480	595
Lowestoft ...	35.000	315,341	2,613,797	8	1·04	70	72	2,788	6/6	·764	1·5	·7	5·75	192	12	19
Maidstone ...	25,000	309,256	2,407,769	7·783	1·036	96·312	85	1,476	8 4	·725	1	1	6·8	133	12	19
Manchester	945,280	19,463,646	205,608,741	11	1·06	218	94·7	5,054	19·3	·683	...	...	...	...	...	662
Nelson ...	45,000	202,781	2,949,784	14·55	·88	65·55	92·59	2,796	4/9	·56	1	1	5·50	108	6	11
Newport ...	89,400	968,524	9,155,356	9·45	1·08	102·41	100	2,798	9/-	·904	1·164	·898	...	...	34	41
Nottingham	262.000	3,843,669	40,535,874	11·43	1·02	155	92·72	...	13/2	·642	1·70	1	6·86	...	105	135
Oldham ...	180.000	2,077,104	22,773,108	10·963	1·19	126·52	121	3,136	12/8	·825	1·11	·884	7	846	47	92
Perth	35.900	252,940	1,813,228	7·16	1·15	50·5	96·25	1,298	4.7	·73	..	...	6·25	120	8	12
Plymouth ...	112.000	820,406	8,839.974	10·77	1·029	78·92	...	2,528	6/9	·663			...	...	...	42
Pontypridd...	40,000	432,006	5,047,168	11·68	1·02	126	81·2	2,509	10/9	·71	1·25	·51	6·5	221	17	26
Rawtenstall	50,000	604,807	5,201,893	8·60	1·22	104	138	1,691	10/9	·751	1·12	·88	9	247·5	15	24
Rochdale ...	130.000	1,778,030	14,584,777	8·16	1·36	112·2	114·90	2,079	12/9	·731	1·07	·90	7·66	660	44	69
Rotherham...	64,000	E 852,639	9,874,231	11·58	1·08	154·3	...	3,701	13,9	·76	...	...	...	...	...	...
	...	RT 128,685	471,690	3·67	2·72	...	...	...	...	1·92	..	...	...	...	...	...
Salford ...	350.000	6,235,278	53,124,546	8·52	1·227	151	108	3,646	15/7	·88	2·20	·46	7·916	2,054	158	200
Southampt'n	122,200	1,543,941	13,162,224	8·52	1·23	108	77·38	3.624	11·1	·82	1·23	·85	...	...		70
Southend ...	78.000	637,366	7,581,104	11·89	1·09	97·2	87	4,708	8/10	·634	1·41	·76	6·5	357	21	31
Southport ...	31,312	463,262	4,663,579	10·067	·94	148·62	98	1,710	11/5	·677	1·6	·62	6·65	825	15	26
So'th Shields	111,357	898,015	10,005,164	11·414	·905	90	110	3,677	6/9	·54	3·1	·38	8·06	338	20	35
Stalybridge	94,063	1,157,163	9,900,591	8·556	·977	105·3	79	1,698	8/7	·743	1·22	·72	6·8	466	40	59
Stockport ...	120,000	1,429,396	11,544,225	8·0	1·39	96·20	78·32	2,290	10·5·9	·627	1·3	·7	7·5	471	29	53
Sunderland	170.000	1,504,356	18,475,671	12·2	·972	108·6	78·4	3.679	8/9	·554	1·34	·68	7	688	43	70
Wallasey ...	84,500	1,291,046	13,105,204	10·15	1·15	155	99·6	3.163	14/11	1	1·89	·54	7	525	48	61
Walsall ...	100,000	719.372	6,121,381	8·509	1·293	61	86	1,885	6·7	·847	1·24	·79	7	345	23	39
Walth'mst'w	130,000	1,166,027	12,579,852	10·788	·736	96·76	95	2,883	5/11	·65	1·18	·86	7·5	430	37	38
Warrington	86,000	455,304	6,134,545	13·473	·909	71·332	102·423	2,406	5/5	·59	1·246	·803	6·401	194·86	12·179	21
West Ham...	296,600	3,756,354	41,152,502	10·95	·828	138	92	4,726	9 7	·73	1·80	·51	7·75	1,235	95	118
Wigan ...	200,300	1,500,846	14,295,274	9·52	1·308	71·47	93·45	2,525	7/9	·74	1·15	·88	7·4	605	44	67
Wolverh'ton	135.000	1,195,326	12,616,881	10·555	1·07	93·44	89	2,625	8·4	·631	1·25	·879	6·85	660·6	36·7	52
Yarmouth ...	56.000	720,702	4,930,728	6·84	1·231	88·05	79	1,746	9/2	·857	1·25	·76	7	375	25	35
York	82.600	707,370	5,946,843	8·41	1·05	72	108	2,193	6 2	·73	1·33	·789	8	270	18	31

TABLE II.—TOWNS WITH SEPARATE GENERATINC STATIOHS FOR TRACTION.

Belfast ...	390,000	6,865,591	65,131,820	9·19	1·02	162	128	2,709	13/9	·61	1·96	·43	8·75	2,350	257	289
Bexley ...	16,500	284,864	2,090,533	7·89	1·57	127	130	2,100	16/6½	1·16	1·59	·63	10	136	8	16
Birkenhead	135,740	1,300,717	15,167,958	11·66	1·071	111·74	69·98	2,811	9/11	·71	1·39	·66	6·84	520·61	50·94	65
Bournem'uth	120.000	1,962,352	17,182,844	8·76	1·46	143	95	3,505	17·5	·824	1·19	·87	6·8	1,140	60	81
Cardiff ...	182,729	2,966,230	31,122,962	10·49	1·09	170	98·5	4,447	15 6	·65	1·44	·736	7·5	1,264	79	130
Coventry ...	135,000	1,125,705	8,407,719	7·5	1·22	62	66	2,714	6 4	·831	1·18	·866	6·4	476	40	46
Glasgow ...	1,150,000	24,403,482	336,654,624	13·795	·769	292·74	106·18	5,499	18 9	·482	2·31	·44	8·13	8.815·65	629·69	851
Huddersfield	160.000	(a) 2,461,107	22,616,710	9·21	1·19	174	82	3,634	14/1	·766	1·35	·71	7·62	885·28	55·33	96
Hull	291,118	4,229,625	45,679,094	10·08	·871	156·91	127·60	5,004	11/3	·603	2·75	·364	9	1,453·12	90·82	160
Leeds ...	525,000	9,204,331	93,679,774	10·17	1·081	178	115·41	3,694	16/2	(b) ·916	1·93	·539	7·56	3,339	222	318
Leicester ...	230,970	4,028,542	37,073,717	9·202	·954	161	...	3,985	12/9	·712	2·18	·984	8	...	...	150
London ...	...	E 58,572,356	516,338,859	8·82	1·01	...	120·18	7,866	...	·73	...	...	9·05	17,728·8	1,335	1,722
		H 636.933	6,613,781	10·38	·77	...	77·12	1,519	...	1·09	...	...	5·85	203·14	23	56
Newcastle ...	300.000	5,333,875	57,840,666	10·81	1·071	193	100	3,992	16/9	·612	1·58	·633	7·5	14·40	133	200
Northampt'n	91.500	658,809	7,309,863	11·09	·94	82·73	..	3,102	6 4	·617	1·34	·7	...	...	...	26
Portsmouth	245.827	2,506,058	26,266,342	10·481	1·052	106·85	90·34	3,325	9/5	·527	1·66	·62	7	1,140	76	100
Preston ...	120,000	970,719	9,567,366	9·85	1·06	79·73	132	2,498	7·2	·603	1·01	·95	7·36	...	...	53
Reading ...	76,500	941,303	8,865,128	9·42	·97	116	110·5	2,680	9·2	·54	1·59	·68	7·5	352	26	36
Sheffield ...	479,622	8,883,576	104,851,408	11·803	·884	218·594	104·644	4,885	16/1	·533	2·789	·379	...	3,372·5	232·587	335
Wellington...	70,000	2,328,849	24,565,376	11·28	1·43	359	85	4,708	44/10	1·031	1·125	·89	7·59	840	75	92

E—Electric trolley system. H—Horse lines. (a) Including 9,895 miles coal haulage. (b) Total expenses per passenger.

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Maidstone Corporation Tramways.—Mr. A. T. Lambert, general manager of Maidstone Corporation Tramways, in his report for the year ended March 31 last, gives an abstract of the financial results, from which it appears that the total income was £10,966, as compared with £10,296 in the previous year. The working expenses were £7,291 against £6,795. After meeting loan charges, there was a deficit chargeable to the borough rate of £821, as compared with a deficit for the previous year of £1,403. The amount of the deficit for each year during the last four years has been rapidly decreasing. The increase in the working expenses during the past year was due chiefly to the heavy cost incurred in maintaining the permanent way. The increasing number of motor omnibuses and other self-propelled heavy vehicles have also contributed largely to the wear and tear of the roads, for a great proportion of which the tramway department had had to pay. The traffic revenue per car-mile was 8·06d., and the working expenses 5·65d. The number of miles run was 309,256, and the number of passengers 2,407,769. The population served is 25,000, and the length of track, 6·75 miles. The consumption of energy per car-mile was 1·2 units, and the number of cars in stock was 19.

Halifax Tramways.—The annual report of the Corporation Tramways, of which Mr. Jas. D. Caird is traffic manager and Mr. J. W. Galloway tramways engineer, for the year ended March 31, 1914, shows that the results reached in the previous year have been well maintained. There has been an increase of about £3,700 in traffic revenue, but working expenses have also increased, so that the gross profit is practically the same. The net profit, however, shows an increase of £962. The particulars are as follows:

	Total.		Per Car-mile.	
	1913-14.	1912-13.	1913-14.	1912-13.
	£	£	d.	d.
Receipts—				
Passengers	106,180	102,578	11·37	11·44
Luggage, mail bags, and parcels	2,437	2,369	·26	·26
Advertising on cars, etc.... ...	1,033	1,026	·11	·12
Total revenue	109,650	105,973	11·74	11·82
Working expenses	73,273	69,661	7·84	7·77
Gross profit	36,377	36,312	3·90	4·05
From this has to be deducted—				
Special & Parliamentary charges	829	2,961	·09	·33
Net interest...	10,288	10,108	1·10	1·13
Contribution to sinking fund ...	11,617	10,562	1·25	1·18
	22,734	23,631	2·44	2·64
Net profit	13,643	12,681	1·46	1·41

The gross capital expenditure stands at £419,335. The total track length amounts to 55½ miles, and the rolling stock consists of 101 cars, of which an average of 77 cars are in use daily. The average energy consumption per car-mile was 1·94 units per car-mile, an increase of ·13, and the cost per unit was 1⅛d.

Portsmouth Corporation Tramways.—The report of the general manager, Mr. W. R. Spaven, for the year ending March 31, 1914, shows an increase in revenue which, although counteracted to some extent by a growth in the working expenses, leaves the total amount for disposal somewhat larger than for either of the two previous years, as will be seen from the following summary:

	1913-14.	1912-13.	1911-12.
	£	£	£
Traffic receipts	115,167	108,087	110,792
Other receipts	1,823	1,745	1,810
Total receipts	116,990	109,832	112,602
Working expenses	57,620	52,226	51,879
Gross profit on working	59,370	57,606	60,723
Interest on credit balances	829	764	689
Total amount for disposal	60,199	58,370	61,412
Appropriated as under:			
Sinking fund	18,263	17,462	17,458
Interest on capital	21,593	20,875	20,798
Income tax	1,301	964	1,109
Renewals fund	8,123	8,412	8,694
Reserve and insurance fund	3,000	3,000	2,000
Depreciation on price of Consols	—	350	846
Contribution in aid of rates	5,000	4,000	4,000
Erection of shelter in Gresham Street ...	119	—	—
Laying feeder cables	32	—	—
Purchase of land	—	—	427
Carried forward	2,768	3,307	6,080

The total revenue works out at 11·204d. per car-mile, as compared with 12·229d. per car-mile for the previous year. There was, however, an increase of £7,158 in the receipts, which is attributed to the opening of extensions, and this also explains the decrease in the earnings per car-mile. The working expenses averaged 5·518d. per car-mile, as compared with 5·815d. per car-mile for the previous year. The number of passengers carried was 26,266,342, an increase of 1,745,695 over the previous year, and the car-miles run were 2,506,058, an increase of 350,550. Energy consumption averaged 1·103 units per car-mile. The ratio of working expenses to receipts was 49·25 per cent. The Corporation now have 34⅔ miles of single track and 100 cars.

Proposed Wigan Extension.—The Corporation intend to ask for powers to borrow £1,240 for additional tramway loops.

LONDON TRAMWAYS ACCOUNTS.

Effect of 750 Omnibuses that Ran on Tramway Routes.

A report on the accounts of London County Council Tramways for the year ended March 31 last, which was issued some time ago, deals with a period in which motor omnibus competition was more intense than ever before, and the effect of this competition is clearly shown in the financial results. After meeting working expenses, interest, and sinking fund there was a deficit of £88,526, and the report discusses the situation at length, makes comparisons with the finance of motor omnibuses, and refers to methods for meeting the competition.

The tramways system on March 31 extended over a total length of 148½ street-miles, being 140½ miles of electric lines and eight miles of horse lines. The income during the year and the working expenses were as follow:

	Electric Traction.	Horse Traction.	Total.
	£	£	£
Income	2,247,043	21,626	2,268,668
Working expenses	1,585,251	30,215	1,615,466
Surplus on working	£661,792	£8,589 (deficiency)	£653,202

The under-mentioned charges have to be set against the surplus on working: Interest (gross), £328,110; sinking fund, £408,488; total, £736,598; income tax (Schedule D), in addition to property tax included in working expenses, £28,197; Parliamentary expenses, etc., £2,086; total, £766,881; less, tax deducted, etc., £25,153, leaving £741,728; deficiency (to come from general reserve fund), £88,526. The deficiency will be met by a transfer from the reserve fund, which on March 31, after meeting the deficiency, amounted to £190,597. There was no sum available to add to the renewals fund, which now stands at £539,749.

The operating expenses for electric traction were £1,585,251, including £6,053 for special charges, or 6·50d. a car-mile run, as compared with 6·62d. a car-mile in 1912-1913. The total working expenses in connection with horse traction amounted to £30,215, or 11·39d. a car-mile run.

The receipts in respect of electric traction amounted to £2,247,043, or 9·21d. a car-mile, as compared with 10·04d. for 1912-13. From lines operated by horse traction the total receipts amounted to £21,625, or 8·15d. a car-mile, as compared with 8·73d. The number of passengers carried and of car-miles run during the year were:

	Electric Traction.	Horse Traction.	Total.
Passengers	516,338,859	6,613,781	522,952,640
Car-miles	58,572,356	636,933	59,209,289

Many lines which have been electrified in recent years are not of a highly remunerative character. The tramways suffer to a serious extent through not being able on many of the routes to carry passengers to their desired destination. The Highways Committee are now about to attempt to secure Parliamentary powers for a scheme for the linking up of the system and the extension to proximate traffic points.

Omnibus Competition—Burdens on the Tramways.

Above all there was the very great increase in the competition from the motor omnibus undertakings. In June, 1912, it is estimated that 280 motor omnibuses were run daily along the routes of the tramways, while in June, 1913, the number had risen to about 750. During the last few months a very large number of return fares have been instituted on the tramways, while transfer facilities have been introduced on several routes. The Board of Trade has agreed to trailer cars being run on several routes on the southern system. Other steps which have been taken include the speeding up and improved regulation of the services, and the provision by means of junction lines of alternative routes to avoid congestion. Further arrangements were made for through running with outside tramways.

The report states that the omnibus companies are not liable, as the Council is, to pay rates for the occupation of the road. The amount paid by the Council under this head in 1913-14 amounted to £86,337, and represents an average relief to the rates of over a halfpenny in the pound. Very considerable expenditure has been incurred by the Council in connection with the construction and maintenance of paving along the tramway routes. It is estimated that the annual saving to the road authorities in consequence of this obligation amounts on the present mileage to about £128,000, and that the extra cost of bituminous grouting to the paving of the tramway tracks necessitated by the damage done by motor omnibuses and other rubber-tyred vehicles amounts at present to £20,000 a year. The tramways account is charged with a considerable portion of the cost of effecting improvements where these are carried out along tramway routes. The amount chargeable to the tramways account in this respect is £800,575, of which £652,067 has already been so charged up to March 31. The total amount charged to the tramways account during 1913-1914 in respect of rates on tracks

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and buildings (£124,259), repair of the permanent way (£104,801), and street widenings (£31,168) was £260,228, and the rates were therefore relieved to this extent.

The following table shows the relative extent to which contributions in respect of the two means of conveyance are made towards the public funds:

	Per Omnibus.	Per Tramcar.
	£ s. d.	£ s. d.
Licences:		
Stage carriage licence (police)	2 0 0	2 0 0
Motor car licence...	3 3 0	Nil
Local taxation licence (carriage duty or wheel tax) ..	0 15 0	0 15 0
Registration (one-fifth of the fee, which is not an annual charge)	0 4 0	Nil
Driver's licence fee under Motor Car Act §	0 7 6	Nil
Driver's police licence and conductor's police licence §	0 15 0	0 15 0
	£7 4 6	£3 10 0
Rates and maintenance of roads:		
Rates on permanent way	Nil	†65 0 0
Maintenance of tramway tracks and margins	Nil	†96 0 0
Other duties and charges:		
Petrol tax	‡30 0 0	Nil
Debt charges on contribution to street widenings ...	Nil	†23 0 0
	£37 4 6	£187 10 0

§ Three licences for every two vehicles in service.
† Calculated on number of vehicles in service in 1913-14.
‡ This figure is approximate, and is based on the best information obtainable.

If the present contributions to public funds are worked out per £100 of gross receipts, the amounts are approximately £2 6s. in the case of the London General Omnibus Company, and £11 1s. in respect of the Council's tramways.

What a Charge of ¾d. Would Entail on Omnibuses.

If the London General Omnibus Company had been called upon to pay ¾d. an omnibus-mile (as has been done in other cases) its contributions towards public funds would have been increased to £107 per omnibus, and approximately £7 per £100 of gross receipts. The expenditure incurred by the Council in respect of the maintenance of the tramway tracks during 1913-1914 was ·418 a car-mile. If there were no adjustment made of the existing burdens, and tramcars were superseded entirely by motor omnibuses, the increased expenditure falling upon the rates on the basis of the present traffic would be equivalent to a rate of 1½d. in the £.

If the London General Omnibus Company had been called upon to pay ¾d. an omnibus-mile for road repairs necessitated by its heavy traffic, the total expenses (including interest and redemption of debentures and income bonds) would have been increased from 8·02d. to 8·4d. an omnibus-mile, which would show a margin of receipts over expenses of only ·1d. per omnibus-mile.

Comparison Based on Equivalent Contributions—Tramways Dividend.

The following table shows as nearly as can be ascertained the results of working tramcars (1913-14) and motor omnibuses (1913) if the contributions towards public funds in respect of motor omnibuses were equivalent to the contributions in respect of tramcars on the basis of the same amount being charged against motor omnibuses per mile as it is now charged against tramcars per mile:

If Equivalent Contributions were made.	Tramcar.	Omnibus.
	£	£
Total receipts	2,247,043	3,258,198
Working expenses	1,585,251	3,245,630
Surplus on working	661,791	14,568
Return on total capital expenditure	6·07%	·46%

If the tramways had been run by other than public authority, and the financial arrangements had followed those ordinarily adopted by a trading company, the surplus on working for 1913-14 might have been apportioned as follows:

	£
Surplus on working	661,791
Less provision for renewals (¾d. per car-mile)	165,208
Available for dividends	496,583

This sum of £496,583 represents a payment of over 5½ per cent. on the net debt outstanding.

Advantages Resulting from the Use of Tramcars.

The omnibus companies provide no workmen's fares. On the other hand, the Council provide workmen's car services on practically all routes at a fare of a 1d. single and 2d. return for journeys of as much as 9½ miles in each direction. 52,754,604 passengers travelled in workmen's cars in 1913-14.

A most important consideration is the relative capacity of the two systems to carry large numbers of passengers during the busy hours of the day. Almost the same number of omnibuses are run during the slack hours as during the busy hours of the day. This lack of expansion of the omnibus service to meet the requirements of the busy hours is not an accidental or temporary condition; it is the economic basis of the system. The whole of the capital expenditure involved in a motor omnibus service is the cost of the omnibuses and the garages, and the capital required consequently increases as the number of omnibuses increases. It is on that account uneconomical to provide omnibuses for the busy hours only, and this is the dominating factor which prevents omnibus companies from running additional omnibuses during these hours

Compare with this the facilities afforded by the tramways to meet the varying requirements of the traffic. During the slack hours the tramcar carries very much the same number of passengers as is carried by the omnibus at the same hours; but when the traffic demands it the tramcar provides 78 seats as compared with 34 by the omnibus Then the service of tramcars is greatly increased during the busy hours—namely, by at least 40 per cent. on every route, while it is doubled or more than doubled on some.

The omnibuses are run over a very large area inside and outside the county, and their mileage is considerably greater than that of the tramways. The total number of passengers carried by the London General Omnibus Company in the year 1913 was 580,205,335, at an average fare of 1·32d. a passenger. The total number of tramway passengers on electric cars in 1913-14 amounted to 516,338,859, carried at an average fare of 1·01d. a passenger. If the tramway passengers had been carried at the average fare charged by the London General Omnibus Company, the public using street conveyances would have had to pay an additional sum of £658,587 for travelling facilities. On the other hand, if all these omnibus passengers had been carried by car at the average fare of 1·01d. a passenger, a saving to the travelling public of £740,048 would have been effected.

TRAMWAY AND LIGHT RAILWAY NOTES.

ABERDEEN.

Wages of Drivers and Conductors—Position of Suburban Tramway Company.

At a recent meeting of Aberdeen Town Council the Tramways Committee reported that they had been in communication with the directors of the Aberdeen Suburban Tramways Company on the subject of the rates of pay to the employees of the company. As a result of the correspondence which had passed, the committee found that the wages had been raised from 4·60d. to 5·4d. per hour in the case of motormen, and from 3·98d. to 5·06d. per hour in the case of conductors. Under these circumstances, the committee resolved to recommend that no further action should be taken in connection with the matter. The action of the committee was approved. A remit was made to the Tramways Committee to report as to the propriety of terminating the working agreement with the Suburban Tramway Company. It was also remitted to the committee to report as to the acquisition by the Council of the undertaking of the company.

ACCRINGTON.

Through Running Discontinued.

At a meeting of Accrington Town Council it was intimated that the through tramway service from Accrington to Bacup would be discontinued. The Accrington cars would turn in Rawtenstall, and this would obviate many delays at Haslingden. It was considered that the through traffic to Bacup was too small to make the continuance of through running desirable.

BIRMINGHAM.

Extensions and Town Planning.

At a meeting of Birmingham Town Council on October 13 Mr. Harrison Barrow presented a report by the Tramways Committee recommending that the committee should be authorised to proceed with the construction of a tramway along Whitmore Street, Ford Street, and Lodge Road, and the extension of an existing tramway at Selly Oak along the Bristol Road, through Northfield and Longbridge to the city boundary at Lickey Road, Rednal; further that they should be authorised to provide additional rolling stock at a total estimated cost of £128,240; that the Finance Committee should be instructed to borrow that amount, and that they should determine in what proportions the yearly sums required to be provided in respect of the sum of £41,958 for the purchase of lands and execution of street improvements should be defrayed out of the revenue arising from the tramway undertaking and the borough fund respectively. Mr. Barrow mentioned that it was proposed to lay about two-thirds of the tramway on a separate sleeper track, which would mean a considerable saving in the cost of construction. Mr. Neville Chamberlain moved that the part of the report dealing with the tramway from Selly Oak to Rednal should be deferred until the adjoining lands had been made the subject of a town-planning scheme Mr. Pepper moved a further amendment indefinitely postponing this part of the scheme on the ground of its being inopportune owing to the stringency of the financial position. After discussion, Mr. Pepper's amendment was carried by 55 votes to 51, and the recommendation of the committee respecting Whitmore Street tramway was agreed.

BLACKPOOL.

P-A-Y-E System for Top-Deck Passengers.

The pay-as-you-enter system is to be adopted for top-deck passengers. This will make it unnecessary for conductors to go upon the top decks to collect fares, and will greatly assist them in their duties.

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BOURNEMOUTH.

DOUBLING OF TRACK—RAILLESS LINE PROJECTED—PASSES FOR THE BLIND.

The Town Council have adopted proposals for alterations and reconstruction of the tramways at a cost of £3,903. The plan submitted by the general manager shows a doubling of the line in Holdenhurst Road, and an extra loop in Ashley Road.—A project for the construction of a railless line and the provision of trolley omnibuses to run between Poole and Sandbanks is under consideration.—The Corporation have decided to grant free passes for local blind people in deserving circumstances.

BRADFORD.

OPENING OF BINGLEY EXTENSION—RAILLESS TRACTION.

Major Druitt, on behalf of the Board of Trade, on October 8 inspected the new tramway from Bingley to Crossflats belonging to Bingley Council, and constructed by Bradford Corporation tramway department. The length of the line is about a mile. It will be worked under lease by Bradford Corporation in the same way as the section from Nab Wood to Bingley. The through fare from Bradford to Crossflats is to be 4d.—The Tramways Committee have recommended the fitting of trolley omnibuses with a patent earthing and automatic steering device, at a cost of £14 per omnibus. The offer of the Leeds Corporation to take over the obligations of Bradford Council with respect to 10 of the railless trolley vehicles now being constructed under a contract for the Bradford Corporation has been accepted.

DERBY.

TRANSFER TICKETS.

The Tramways Committee have decided to experiment with transfer tickets on various routes.

EDINBURGH.

PROPOSED EXTENSION TO QUEENSFERRY.

A few years ago an unsuccessful proposal was made by a company for the construction of a tramway from Edinburgh to Queensferry, a distance of about eight miles. The scheme is now being revived municipally, and at a meeting of Edinburgh Tramways Committee on October 2 consideration was given to a motion by Councillor Deas for a report as to the expediency of providing tramways to Queensferry, in view of the increased and rapidly growing inter-communication between Edinburgh and Queensferry, and the development of Rosyth. Two alternative routes are to be gone over by a sub-committee, one from the Dean Bridge, and the other by Murrayfield and Ravelston, where a new road is projected.

GLASGOW.

CONSTRUCTION OF NEW TRAMWAYS—LEASE OF HARBOUR TUNNEL.

In the last session of Parliament Glasgow Corporation obtained authority to construct additional tramways over about 20 miles of route, and a start has now been made in the building of the first of these lines, which is to extend from Cathcart to Clarkson.—Glasgow Tramways Committee have confirmed a recommendation of a sub-committee that the Corporation should take a 10 years' lease of Glasgow Harbour tunnel from the company owning it, at a rent of £3,000 a year. The cost of maintenance and the rates are to be paid by the Corporation.

HUDDERSFIELD.

AN IMPORTANT EXTENSION.

Colonel Druitt, of the Board of Trade, inspected the extension of Huddersfield Corporation tramways from Slaithwaite to Marsden on October 1, and the line was soon afterwards opened for traffic. The distance from the centre of Huddersfield to Marsden is fully seven miles, and the fare is 5d., as compared with 7d. on the railway. The length of the new route is 2 miles 36 chains, and the single-track length is 4 miles 70 chains. The track construction, which was carried out under the supervision of Mr. K. F. Campbell, the borough engineer, occupied a little over three months. Granite sett paving and welded joints are employed. Mr. R. H. Wilkinson, the tramway manager, was responsible for the electrical equipment, and the whole work was executed under the administration of the Tramways Committee.

ILFORD.

PRICE OF ELECTRICAL ENERGY.

The price of energy for the tramways department has been fixed by the Electricity Committee at $1\frac{1}{16}$d. per unit during the year ending March 31 next.

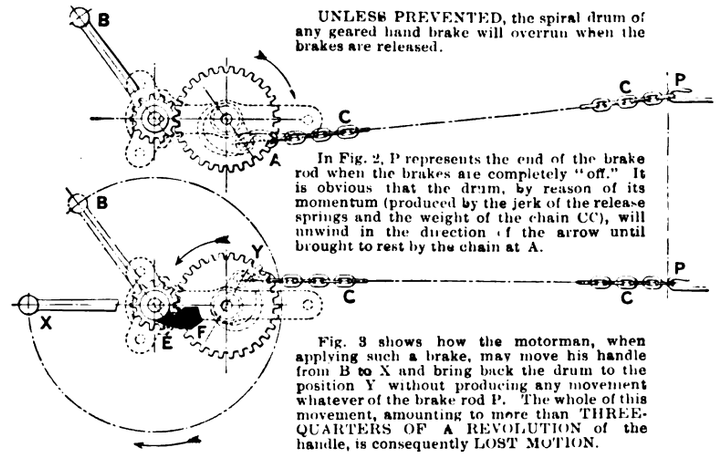
LEEDS.

TRAMWAY EXTENSIONS—NEW OFFICES—COMMITTEE ORGANISATIONS.

Work is being begun on the construction of the new Leeds tramway line at Guiseley, and a start is to be made with the erection of the overhead equipment for the railless cars which will run from the White Cross, Guiseley, through Otley, to Burley. It is hoped also to begin the construction of the tramway extension from York Road to Halton, and the workmen will shortly begin the erection of the new tramway offices at the junction of Swinegate and Lower Briggate.—The Tramways and Electricity Committee have decided to apply for power to borrow £32,000 for the construction of the new offices.—At a recent

THE "PEACOCK" IMPROVED BRAKE

(PATENT).



UNLESS PREVENTED, the spiral drum of any geared hand brake will overrun when the brakes are released.

In Fig. 2, P represents the end of the brake rod when the brakes are completely "off." It is obvious that the drum, by reason of its momentum (produced by the jerk of the release springs and the weight of the chain CC), will unwind in the direction of the arrow until brought to rest by the chain at A.

Fig. 3 shows how the motorman, when applying such a brake, may move his handle from B to X and bring back the drum to the position Y without producing any movement whatever of the brake rod P. The whole of this movement, amounting to more than THREE-QUARTERS OF A REVOLUTION of the handle, is consequently LOST MOTION.

The stops EF, which form the special feature of the "Peacock" IMPROVED Brake, eliminate this lost motion altogether by stopping the drums ALWAYS at Y, which is the most favourable position for a quick recovery of chain.

The "PEACOCK" BRAKE CO., 27, Clements Lane, LONDON, E.C.

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meeting of the Council a resolution was moved for the appointment of separate committees for the management of the tramways and electricity departments. Alderman Brown said he hoped the motion would be withdrawn. There had been a growing feeling of late among all parties that the management of the electricity department should be reconsidered. Alderman Smithson, chairman of the Tramways Committee, agreed with this view, but said it would be better to leave the question over for the new Council to decide, and after further discussion the motion was withdrawn.

LONDON.

A Conductor Acting as Driver—Removal of Centre Standards.

The Court of Appeal have granted a new trial in the action of Ricketts *v.* Thomas Tilling, Limited, which was tried some time ago before Mr. Justice Atkin and a common jury. The plaintiff sought to recover damages for personal injuries alleged to have been caused owing to the negligence of the defendants' servants. When the accident occurred the plaintiff was standing on the foot pavement in Hackney Road, an omnibus belonging to the defendants was driven along, and for some reason the conductor was driving while the driver was sitting by his side. The omnibus mounted the pavement and knocked down several persons, one of whom was killed. The plaintiff was injured, and for a considerable time was unable to follow his calling. The judge held that there was no case to go to the jury, as there was no evidence that the conductor was authorised by the defendants to drive the omnibus or that the driver was under the necessity of delegating his duties. In the Court of Appeal Lord Justice Buckley said that the driver owed a duty to his employers to prevent someone else from driving, or, if he allowed it, to see that the other person drove properly. In his opinion it was a question for the jury whether the driver had committed a breach of his duty. Lord Justice Phillimore and Lord Justice Pickford were of the same opinion, and a new trial was accordingly ordered.—The London United Tramways Company, by arrangement with the special Tramways Committee of the Ealing Town Council, has agreed to remove the central standards. An estimate of the cost of removal is to be supplied to the Council, as the company decline to incur the expense unless an extension of its tramway concession is granted.

NEWCASTLE

Through Running with Gateshead.

At a meeting of Newcastle Tramways Committee on September 24 it was decided to recommend the Corporation to carry out the undertaking given to the Committee of the House of Lords when the North Eastern Railway Company's Bill was under consideration, that the Corporation would next session seek Parliamentary powers for through running between Newcastle and Gateshead. Last session the railway company sought authority from Parliament to run omnibuses over the high-level bridge, and this was successfully opposed by the Corporation. It was at that time intimated that the City Council would seek to obtain powers to connect the Newcastle and Gateshead tramway system by way of the bridge. The committee also agreed that the chairman and vice-chairman should interview Sir A. Kaye Butterworth, general manager of the North Eastern Railway Company, with the object of trying to come to an amicable arrangement.

NOTTINGHAM.

Opening of Extension

A new tramway was opened for traffic on September 25. It extends from the Market Place to Gregory Street, Derby Road, and the journey occupies about a quarter of an hour.

PONTYPRIDD.

Through Running with Rhondda Tramway Company.

An effort is being made to secure through running services between Pontypridd and Porth over the lines of the Pontypridd Corporation tramways and the Rhondda Tramway Company's lines. Members of the Corporation Committee are to interview representatives of the tramway company with a view to obtaining through services, which it is thought would be a great convenience to the public and improve the traffic receipts.

RAWTENSTALL.

Regenerative *v.* Series-Parallel Control.

At a meeting of Rawtenstall Town Council, Mr. J. Taylor asked how it was that the receipts on the tramways were down 15 per cent., while the cost of fuel supplied for the tramways was up 5 per cent. Alderman Coope, in reply, said that the reason why the receipts were down was that they had not sufficient traffic. As to the increase in the cost for fuel, they had turned most of the cars from the regenerative-control system to the series-parallel system, and it had taken more current to drive a car than it did in the other way. The change had to be made in order to meet the requirements of the Board of Trade.

ROCHDALE.

Workmen's Fares.

The Tramways Committee have decided to extend the time for the use of workmen's tickets in the morning from 7-30 to 8-30, and to allow the return journey to be made at any hour in the evening and up to 3 o'clock on Saturday afternoons. It was also decided that the special workmen's cars in the evening be abolished with the exception of one car in each section. The effect of this will be that a workman who has not taken a return ticket in the morning will be required to pay the ordinary fare in the evening, unless he travels by the one particular car allotted.

ROTHERHAM.

Discontinuance of Through Running with Sheffield.

Rotherham Town Council have adopted a report by their Electric Light and Tramways Committee recommending the Council not to renew their running agreement with Sheffield Corporation. The principal reason for terminating the arrangement is that Sheffield Corporation wished ½d. fares to be charged on the Tinsley route, a course to which Rotherham would not consent. Rotherham Town Council have also agreed to seek powers to run trackless trolley vehicles or motor omnibuses on a number of additional routes and to obtain compulsory through running powers on the tramways with Sheffield.

SOUTH SHIELDS.

Tramway Extensions and Motor Omnibuses.

The Town Council intend to promote a bill in Parliament for authority to run motor omnibuses outside the borough limits. The bill will also include an application for power to extend the tramways.

STIRLING.

Perpetuating an Anachronism.

It appears that there is now no hope of Stirling possessing an electric tramway system for years to come. Some time ago the Town Council refused to accept an offer by Mr. Balfour, of Messrs. Balfour, Beatty, and Company, which would have led to electrification, and now the war has put out of the question any scheme for the Corporation carrying out the work itself. The remaining course open is to give the Stirling and Bridge of Allan Tramways Company security of tenure for some years so that they may continue their experiments with petrol cars. The line is one of the few remaining in the country which is worked by horses.

PATENT LIST.

Specially abstracted for "The Tramway and Railway World" from the Official Journal of Patents.

*** If the inventions have been communicated the names of the communicators are given below in italics.

Applications.

The following Applications for Letters Patent have been filed:

20,253 Holder for railway and tramway tickets—W. Mottershead.
20,312 Dynamo-electrical machines—British Thomson-Houston Company *(General Electric Company)*.
20,325 Aligning device for trolley heads—A. W. Maley and G. N. Cadbury.
20,342 Electric signalling—H. Green and W. De M. Landon.
20,373 Steam turbines—Warwick Machinery Company (1908), Limited, and F. Samuelson.
20,423 Underframes for railway vehicles—A. Spencer.
20,431 Superheaters for locomotives—H. A. Stenning and J. H. Stirling.
20,436 Railway electric signals—E. O. Evans and J. B. Saunders and Company, Limited.
20,471 Signalling apparatus for railways—S. Hue.
20,474 Draw bar yokes for railway cars—T. Cantley.
20,508 Steam superheaters for locomotives—J. G. Robinson.
20,549 High-voltage insulated cable—C. J. Beaver and E. A. Claremont.

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"Past results have been so satisfactory that we have this year decided to place the whole of our order in your hands."

20,574 End door fastener for rail cars—C. Roberts and Company, Limited, and J. Wyld.
20,635 Method of making a rail joint homogenous and continuous—J. Major.
20,729 Sleepers for permanent way—C. P. Sandberg.
20,730 Double-decked vehicles—L. Spangler.
20,836 Speed regulation for petrol engines and other prime movers—W. A. Stevens.
20,871 } Automatic coupling mechanism for railway vehicles—R.
20,872 } Belfield *(J. Stanislaus Doyle and F. Hedley).*
20,880 Brakes for rolling stock—A. W. Maley and G. N. Cadbury.
20,885 Locomotive signal apparatus—C. G. Ebbage.
20,913 Railway sleepers—A. T. Harvey
21,059 Motor trains—H. Reik and Oesterreichische Daimler-Motoren-Akt.-Ges.
21,081 Apparatus for use with superheaters on locomotives—J. G. Robinson.
21,088 Automatic safety controllers for contractors' locomotives—Barnes Train Stop Company, Limited, and F. G. Barnes.
21,157 Points, switches, etc., for electrical vehicles—R. Cumming.
21,241 Wind screens—E. Black.
21,262 Axle boxes—C. H. Woodhead, A. G. Elliott, and M. W. Middleton.
21,364 Attachment of chairs to sleepers—A. H. McMurdo.
21,406 Control systems for railways—J. Cowell, junr., and T. McCaughan.
21,482 Electrical insulation of track rails—C. P. Sandberg.
21,487 Steam superheaters—H. A. Stenning and J. H. Stirling.
21,488 Automatic cut-outs for electrical installations—A. H. Midgley and C. A. Vandervell.

Specifications Published, 1913.

26,821 Reversing gear for locomotives—Casey and Cavin.
26,268 Contacts for closing electric circuits on railway tracks—Colas.
26,158 Railway chair—Whittington
19,963 Automatic couplers for railway vehicles—Johnston.
29,318 Brake apparatus for railway vehicles—Spencer.
22,047 Keys for securing rails to chairs—Hughes, Hughes, and Davies.
23,333 Means for indicating deflections of rails when subjected to transverse stress—W. R Sykes Interlocking Signal Company.
22,224 Electro-pneumatic air-brake systems—British Thomson-Houston Company *(General Electric Company).*
21,753 Life-guards and safety attachments for motor vehicles, tramcars, etc.—Bateman

1914.

13,641 Safety brakes and guards of tramcars, etc.—Dampier.
12,955 Fluid-pressure braking apparatus—Turner.
5,807 Track ramps for signalling and train stopping apparatus—Ballington and Shaw.
9,611 Track circuits for railways—Dammond.
9,733 Car trucks—Brooks.
3,449 Rail joints—Shaw.
2,642 Means for securing brake shoes to brake blocks—Metropolitan Carriage, Wagon, and Finance Co. and Squires.

Colonial and Foreign Tramways Traffic Returns.

NAME OF COMPANY.	1913. WEEKS ENDED. Oct. 4.	Oct. 11.	Oct. 18.	Oct. 25.		1914. WEEKS ENDED. Oct. 3.	Oct. 10.	Oct. 17.	Oct. 24.		AGGREGATE. Wks.	1914.	Increase or Decrease.
	£	£	£	£		£	£	£	£			£	£
Anglo-Argentine	55.030	56.823	52.547	57.311	...	49.254	53.843	52.353	49.213	...	42	2.273.953	– 48.448
Auckland ... ... (28 days	19.945	...	...	...	...	20.995	...	...	...	...	12	65.350	+ 3.797
Calcutta ... ... Rs.	73.068	69.438	53.404	59.024	...	58.053	53.243	54.516	55.488	...	42	28.42.557	+ 70.441
Madras	(2 weeks) 26.161	...	...	...	...	(2 weeks) 24.042	...	...	...	...	41	541.291	+ 30.947

Companies Issuing Monthly Statements.

	July.	Aug.	Sept.	Oct.	Nov.	Dec.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Wks.	AGGREGATE. 1914.	+ or –.
	£	£	£				£	£	£					£	£
Brazilian Street Mtrs.	...	...	...	...	...	...	...	...	...	...	...	...	—	—	—
Brazilian Traction ..	...	418.837	...	...	...	...	...	347.645	...	...	...	...	35	3,196,333	– 14.168
Brisbane ...	26.205	29.970	...	...	...	...	29.680	33.172	...	...	...	...	35	231.827	+ 24.649
British Columbia $	755.943	770.628	..	...	...	...	690.023	674.812	...	...	...	...	9	1,364,835	–161,736
Buenos Aires Pt. & C.	...	...	...	...	...	...	...	...	...	...	...	...	—	—	—
Buenos Ayres Lacroze	45.221	...	...	...	...	...	43.327	...	...	...	...	...	4	43.327	– 1.894
Cape Town	...	...	...	...	...	...	...	...	...	...	...	...	—	—	—
Carthagena & Herrerias	3.794	2.192	1.344	...	...	...	1.567	2.758	2.175	...	...	...	39	21.145	– 3.516
Cordoba	13.629	13.691	...	...	...	...	14.256	13.371	...	...	...	...	21	69.583	+ 2.201
East India	1.892	2.005	2.028	...	...	...	1.966	2.112	1.980	...	...	...	8	4.092	+ 59
Kalgoorlie	2.796	3.357	...	...	...	...	2.552	3.042	...	...	...	...	34	21.116	– 2.263
La Plata	4.770	...	4.528	...	...	...	4.359	...	4.190	...	...	...	39	41.852	– 3.659
Lima	34.426	33.939	...	..	...	...	34.600	29.800	...	...	...	...	35	271.607	+ 5.102
Manaos	...	...	...	...	...	...	...	...	...	...	...	...	—	—	—
Melbourne	...	...	..	...	...	...	...	...	...	...	...	...	—	—	—
Mexico ... ... $	...	635.445	...	...	...	...	...	687.593	...	...	...	...	35	4,846,344	+334,757
Montevideo	29.189	28.829	27.870	...	...	...	26.417	26.075	23.227	...	...	...	47	334.965	– 9.336
Para	23.686	24.485	...	...	...	...	20.169	19.354	...	...	...	...	39	189.946	– 38.540
Port Elizabeth ...	...	...	...	...	...	...	...	...	...	...	...	...	—	—	—
Puebla ... ... $	56.700	52.900	51.100	...	...	...	51.000	50.500	52.200	...	...	...	39	534.500	+ 18.800
Rangoon	...	...	5.054	...	...	...	...	...	4.119	...	...	...	39	46.057	+ 421
Rio de Janeiro... ...	...	...	...	...	...	...	...	...	...	...	...	...	—	—	—
Toronto ... ... $	811.966	850.222	...	...	...	...	866.221	850.639	...	...	...	...	35	6,742,786	+425,112
Winnipeg ... $	336.821	340.507	...	...	...	...	346.630	322.762	...	...	...	...	35	2,760,944	+111.242

(Continued on page 350).

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TRAFFIC RETURNS—*continued.*

Tramways and Omnibus Undertakings in the United Kingdom.

NAME OF COMPANY OR CORPORATION.	1913. WEEKS ENDED.				1914. WEEKS ENDED.				AGGREGATE.		
	Oct. 4.	Oct. 11.	Oct. 18.	Oct. 25.	Oct. 3.	Oct. 10.	Oct. 17.	Oct. 24.	Wks.	1914.	Increase or Decrease.
	£	£	£	£	£	£	£	£		£	£
Aberdeen Corporation	1,604	1,636	1,505	1,453	1,617	1,563	1,452	1,465	21	35,962	+ 453
Accrington Corporation	599	576	576	607	502	451	466	454	29	16,507	- 491
Ayr Corporation	366	262	255	254	288	251	237	232	23	10,158	- 860
Bath Electric	1,078	1,061	916	869	981	872	829	763	42	41,543	+ 185
Birkenhead Corporation	1,279	1,245	1,292	1,187	1,249	1,210	1,202	1,178	29½	38,060	- 959
Birmingham Corporation	12,763	12,281	12,427	12,388	11,802	11,702	11,782	11,780	30	362,452	+ 13,258
Blackburn Corporation	1,390	1,331	1,259	1,457	1,217	1,180	1,114	1,122	30	40,745	+ 500
Blackpool Corporation	2,527	1,291	1,036	941	1,738	1,004	870	710	30	61,082	- 9,822
Bolton Corporation	2,791	2,748	2,854	2,606	2,526	2,482	2,464	2,341	30	83,447	+ 577
Bournemouth Corporation	2,009	1,935	1,834	1,785	1,748	1,631	1,662	1,615	30	64,838	- 3,759
Bradford Corporation	6,136	5,797	6,170	5,974	5,877	5,995	6,561	5,817	30	188,871	+ 8,551
Brighton Corporation	1,135	1,047	1,055	946	1,087	1,018	927	916	29½	35,900	- 228
Bristol	8,604	7,761	7,892	7,458	8,633	8,156	8,029	7,681	42½	365,869	+ 20,614
British Electrical Federation	...	...	...	...	...	...	...	...	—	—	—
Burnley Corporation	1,781	1,804	1,737	1,676	1,443	1,410	1,282	1,328	30	47,769	- 4,196
Burton-on-Trent Corporation	297	333	287	272	288	308	279	284	30	9,124	+ 266
Bury Corporation	1,331	1,378	1,386	1,324	1,249	1,262	1,223	1,151	29½	42,501	+ 1,164
Cardiff Corporation	2,784	2,688	2,648	2,578	2,628	2,575	2,490	2,513	29	84,437	+ 1,264
Chatham and District	1,078	1,012	952	941	1,153	1,069	1,027	999	42	40,579	+ 1,005
Chesterfield Corporation	268	260	261	256	249	244	245	244	29	8,122	+ 406
Colne Corporation	287	271	285	270	226	255	207	194	—	—	—
Cork Electric	557	519	510	479	519	523	479	480	42	21,346	- 8
Croydon Corporation	1,817	1,627	1,616	...	1,674	1,642	1,585	...	28	50,590	+ 2,195
Darlington Corporation	255	254	245	245	265	262	253	247	30	8,051	+ 514
Derby Corporation	1,041	1,000	971	963	968	949	951	951	29½	30,825	+ 825
Dover Corporation	285	247	239	269	271	263	275	248	30	7,948	- 124
Dublin and Lucan	141	109	123	110	155	139	127	129	16½	2,615	- 38
Dublin United	3,794	3,707	4,158	4,329	6,151	5,821	5,701	5,763	42	249,815	+ 14,043
Dundee City	1,379	1,389	1,292	1,278	1,284	1,340	1,197	1,226	22½	29,985	- 380
East Ham Corporation	989	998	976	957	1,207	1,221	1,188	1,194	29½	33,953	+ 4,364
Exeter Corporation	377	346	342	336	361	350	331	332	30	11,009	+ 221
Gearless Motor 'Buses	...	...	...	...	...	...	...	...	—	—	—
Glasgow Corporation	21,881	21,009	21,312	21,041	20,577	20,632	20,331	20,411	20	424,742	+ 4,852
Glossop (Urban Elec. Supply Co.)	139	129	136	126	106	99	102	100	43	5,309	- 298
Halifax Corporation	2,209	2,019	2,073	2,219	2,048	2,097	2,141	2,083	29	66,785	+ 2,889
Hastings and District	1,293	1,045	977	936	1,084	989	875	856	42	44,180	- 2,774
Huddersfield Corporation	2,219	2,078	2,160	2,114	2,303	2,437	2,379	2,335	30	90,982	+ 6,949
Hull Corporation	3,210	3,866	4,419	3,159	3,024	3,361	3,739	2,912	30	93,837	- 266
Ilford U.D. Council	458	439	439	441	590	568	551	564	30	16,927	+ 3,310
Ilkeston Corporation	137	132	179	123	121	122	115	150	30	4,023	- 158
Ipswich Corporation	505	444	428	422	433	413	396	397	30	14,431	- 183
Isle of Thanet	712	497	493	408	600	487	405	372	3	1,505	- 269
Kilmarnock Corporation	180	164	170	174	159	150	148	145	23	3,895	- 325
Lanarkshire	2,116	1,870	1,855	2,057	1,849	1,787	1,782	1,931	42	79,634	+ 7,612
Lancashire United	1,791	1,650	1,647	1,698	1,586	1,517	1,543	1,526	42	69,589	+ 4,033
Leeds City	8,778	8,166	8,313	8,169	8,018	7,985	8,016	7,895	30	249,749	- 1,004
Leicester Corporation	2,956	3,039	2,881	2,837	2,670	2,938	2,725	2,706	43	122,490	+ 2,569
Leith Corporation	755	698	687	674	676	688	657	675	23	17,290	+ 204
Leyton U. D. Council	1,450	1,341	1,300	1,322	1,341	1,343	1,328	1,323	28	40,249	+ 1,693
Liverpool Corporation	13,457	12,941	13,435	12,742	12,905	12,579	12,570	12,812	42½	561,239	+ 10,912
Llandudno and Colwyn Bay	291	246	213	196	265	226	201	177	47	18,843	- 2,028
London County Council	43,852	43,145	42,858	43,378	43,504	44,539	44,401	46,246	29	1,285,024	+ 55,467
London General Omnibus	...	...	...	...	...	...	...	...	—	—	—
London United	...	...	...	...	...	...	...	...	—	—	—
Lowestoft Corporation	221	202	203	197	193	177	191	183	3	640	- 89
Maidstone Corporation	277	227	202	215	254	217	183	198	30	6,639	+ 228
Manchester Corporation	18,428	17,591	18,032	17,673	17,021	16,904	16,634	16,448	30	521,888	- 4,885
Metro. Electric Tramways	...	...	...	...	...	...	...	...	—	—	—
National Steam Car	3,681	3,666	3,869	4,932	4,719	4,184	4,276	5,496	52	224,505	+ 77,070
Nelson Corporation	204	194	206	206	177	144	144	133	29½	5,866	- 593
Newcastle-on-Tyne Corporation	5,077	5,090	5,005	5,441	5,732	5,703	5,571	5,692	30	162,198	+ 16,288
Newport (Mon.) Corporation	798	797	780	754	782	778	749	763	30	25,129	+ 1,966
New St. Helens and District	855	807	797	799	1,002	952	996	989	16	16,211	+ 1,464
Northampton Corporation	637	569	532	551	631	602	584	563	29	17,776	+ 64
Nottingham Corporation	3,838	4,295	3,411	3,314	3,406	3,879	3,230	3,242	29½	101,893	+ 1,692
Oldham Corporation	2,246	2,238	2,370	2,196	1,949	1,953	1,926	1,883	31	69,541	+ 625
Portsmouth Corporation	2,408	2,167	2,198	2,085	2,148	2,347	2,101	2,095	30	75,892	—
Preston Corporation	951	864	898	859	885	873	852	838	30	27,853	+ 974
Provincial	2,052	1,835	1,708	1,741	2,202	2,098	2,008	2,066	3½	7,180	+ 878
Reading Corporation	730	709	685	704	674	688	667	650	29	21,408	+ 612
Rhondda Tramways	1,314	1,265	1,298	1,409	1,259	1,203	1,212	1,183	42	52,381	+ 1,427
Rochdale Corporation	1,690	1,587	1,660	1,625	1,506	1,458	1,478	1,439	30	50,005	+ 894
Rotherham Corporation	997	1,046	1,067	1,006	1,130	1,109	1,075	952	30	31,592	+ 1,343
Salford Corporation	5,212	5,227	5,329	5,064	4,807	4,799	4,676	4,556	29	152,524	- 5,251
Sheffield Corporation	7,441	7,716	7,727	7,458	7,607	7,682	7,541	7,473	30	237,012	+ 6,905
Southampton Corporation	1,502	1,401	1,303	1,261	1,271	1,257	1,192	1,148	29	40,597	+ 105
Southend-on-Sea Corporation	1,062	879	841	791	954	846	736	737	30	34,101	+ 2,407
South Metro. Tramways	...	...	...	...	...	...	...	...	—	—	—
South Shields Corporation	727	714	699	668	701	699	680	659	29½	23,471	+ 1,526
Sunderland Corporation	1,401	1,416	1,423	1,327	1,324	1,346	1,291	1,334	30	45,388	+ 970
Swindon Corporation	184	174	166	169	179	180	174	171	29	5,359	+ 360
Torquay Tramways	651	591	571	490	518	491	440	440	42	24,564	- 3,527
Tramways (M.E.T.) Omnibus Co.	...	...	...	...	...	...	...	...	—	—	—
Tyneside Tramways and Tramroads	531	487	492	717	709	684	670	654	17	10,823	+ 1,653
Wallasey Corporation	1,233	1,130	1,199	1,134	1,148	1,119	1,078	1,088	29½	39,554	+ 1,458
Walsall Corporation	672	625	650	623	636	616	631	631	43	26,848	+ 150
Walthamstow U.D. Council	788	691	702	712	777	748	712	723	30	25,156	+ 2,429
Warrington Corporation	375	454	458	447	416	...	...	...	—	—	—
West Ham Corporation	2,837	2,739	2,691	2,713	2,781	2,765	2,728	2,698	29	83,954	+ 3,239
Wigan Corporation	1,522	1,505	1,575	1,617	1,401	1,414	1,437	1,375	29	43,339	- 755
Wolverhampton Corporation	909	1,162	1,059	1,038	999	1,008	960	985	31	32,369	- 908
Yorkshire (West Riding)	1,423	1,435	1,481	1,346	1,472	1,464	1,371	1,322	43	62,578	+ 206

ELECTRIC RAILWAY TRAFFIC RETURNS.

Owing to the European war, the Government have taken over the railways of Great Britain as from August 4, and the issue of traffic returns has been suspended. Consequently the traffic returns of the electric railways which usually appear on this page cannot be given.

TRAMWAY DIRECTORIES.

A useful feature of this issue is the directory of electric railways and electric tramways which will be found among the advertising pages. This directory contains the names of the chief officals and the principal particulars relating to each undertaking.

The directory is revised as occasion requires, and is the most up-to-date and comprehensive list published.

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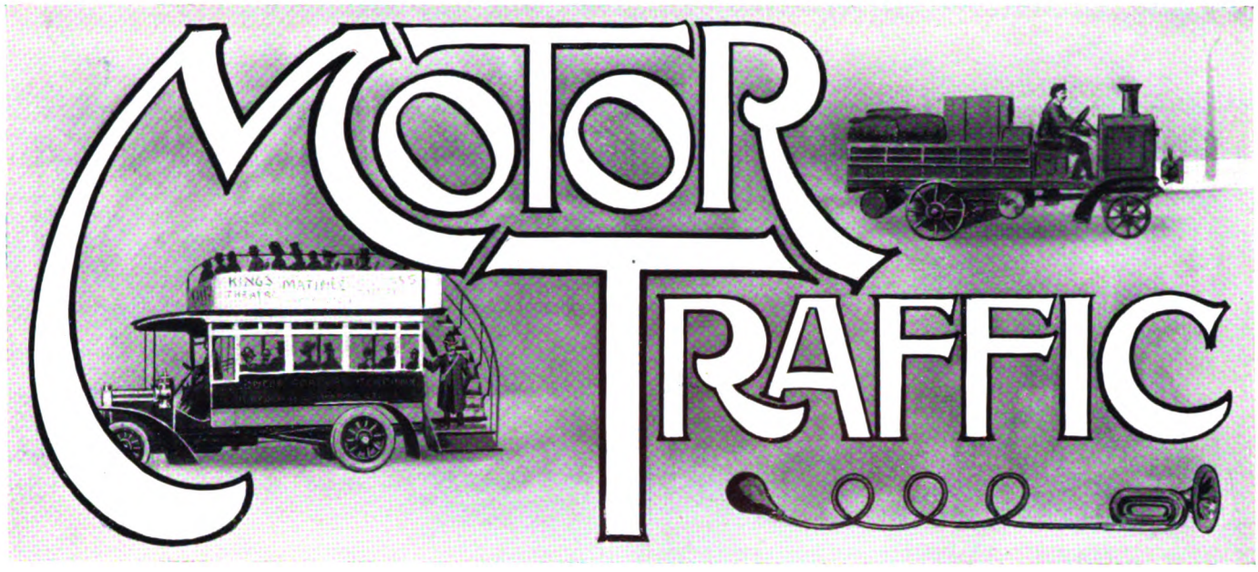

The experience gained in the working of the mechanical transport section of the Army Service Corps will be of such importance that it is to be hoped that when the European conflict is ended there will not be so much delay in the issue of departmental reports as is usual in the publication of official histories of wars. Indeed, it is desirable, notwithstanding the great pressure under which the mechanical transport department is working, that reports should be issued even while the war is in progress. In this the severest test to which motor conveyances could be subjected—not in regard to distances traversed for single journeys, but in relation to the general behaviour of type and to the emergency repairs necessitated by rough usage and gunfire—it is of the highest importance to the Government and to the commercial community that there should be interim reports. The business men of the country have provided the thousands of vehicles which the War Office have impressed into the national service, but there is the wider reason of the national weal that should encourage the department to act in this matter not simply in their own behalf but as the trustees of the interests of the Empire. The manner in which other Government departments, since the beginning of the war, have realised this aspect of their responsibility, as shown, for instance, by their directing attention to the opportunities for capturing German and Austrian trade, leads us to express the hope that similar zeal will possess the War Office in regard to motor traction, especially as last year the Colonial Office and the Government generally gave every encouragement to the Imperial Motor Transport Conference. If our motor transport staff now on the Continent is insufficient promptly to provide the reports for which we plead, there ought to be no hesitation in detailing such additional officers as may be required for the purpose. In proportion to the magnitude of their task the number of officers of the motor transport department in peace time was altogether insufficient for the demands of this war, but steps were taken to add to their number by the enlistment of automobile engineers and others conversant with the working of motor vehicles on a large scale. These additions no doubt included many men to whom the work of keeping records has formed an important part of their experience, and it is to be presumed that they will be keen to continue the practice under the novel circumstances in which they now find themselves placed. Their advice will probably be found useful in revising and extending the returns and statistics already called for and also in preventing the mechanical transport department coming under the bonds of red tape that are occasionally alleged to impair the working of the military machine elsewhere.

A right appreciation of the advantages to commercial motor manufacturers of the dissemination of the information and experience gained in the Continental conflict both with British and captured vehicles may as likely as not contribute towards gaining the ultimate victory for the Allies. There is no doubt that the department has now the best civil experience to draw upon, for it is known that a number of firms with wide experience in motor traction have placed their services at the disposal of the State, while the London General Omnibus Company, in common with other manufacturers, have released highly-trained men from their staff for war service. Then, again, the large number of the London General Omnibus drivers, who as members of the Special Reserve have been called up to take charge of the impressed omnibuses and other vehicles, are men who realise the importance of the careful reporting of the work of their machines, for it is upon the careful observance of that important duty that the company have been enabled to bring their chassis to its present efficient state. Beyond doubt the company would appreciate the advantage of receiving reports, even at the present comparatively early stage of the war, giving particulars of the performances of their vehicles. The London omnibus has been in use in its everyday guise for the conveyance of troops, wounded men, stores, and munitions, while many of the omnibuses have been taken up to the front, stripped of their bodies in order to render them less conspicuous and fitted with bare platforms. In this way the omnibus has proved of special value for moving men and machine guns from one point to another. That the Germans have had a greater number of motor vehicles at their disposal is apparent from published reports, but the combined efforts of Great Britain and France have probably by this time given the Allies the ascendancy in that respect. Belgian motorists, too, have utilised the ordinary motor car in increased numbers for a renewal of their heroic resistance, and together with the British authorities have thus given an example of how the thousands of private motorists who have offered themselves and their cars in the service of their country may be best utilised.

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MOTOR TRAFFIC.

MOTOR AND RAILLESS OMNIBUS COSTS.

RESULTS FROM MUNICIPAL UNDERTAKINGS.

We give below a summary of the interesting series of reports relating to the financial working of several municipal motor omnibus undertakings which have appeared since the close of the last financial year. These undertakings are all worked in conjunction and, indeed, as part of the municipal tramway systems in the respective towns; but the two undertakings have a separate system of accounting, and in all cases care has been taken to give an exact statement with respect to the omnibus working. The figures are consequently a reliable indication of what results may now be obtained in the towns of considerable size from the careful running of motor omnibuses. The undertakings enumerated are, as will be seen from the statistics, as yet on a small scale, but with one exception, where the omnibuses have been at work for only nine months, all show a margin of profit after allowing for deductions, capital charges, and depreciations. The earnings per omnibus-mile are not large, and the satisfactory results are due to the low operating expenses. One of the most encouraging examples is that of Sheffield, where the working costs per omnibus-mile were 6·675d. This favourable result should be specially gratifying to Mr. A. R. Fearnley, the general manager of Sheffield tramways, for he was one of the first tramway managers to point out the advantages that would probably accrue from the working of motor omnibuses as feeders to tramway systems. In the case of all six of the undertakings referred to in the subjoined table there is no doubt that the associated tramways have benefited considerably by the feeding action of the omnibus extensions.

Sheffield is now working 13 omnibuses, and six more have been ordered, as power was recently obtained from Parliament to run the vehicles on additional routes, so as to include all but one of the main outlets from the city. The results obtained are quite comparable with those which are believed to represent the costs per mile run by the London General Omnibus Company, though that body works on such a large scale. A comparison of working expenses with those of three other municipal omnibus undertakings shows that excluding capital charges and depreciation, so as to compare with the Sheffield figure of 6·675d., the working cost in Wolverhampton is 8·287d. In Birmingham the figure is 9·288d., among the items which stand high being petrol at 2·556d. per mile run. Another field for comparison of a highly interesting kind will shortly be opened when figures become available for the Edison battery omnibuses which have been started in South Shields and Southend, and will shortly be running at York. In many quarters great things are hoped for with this form of traction.

In the third table particulars are given of the working expenses of the railless trolley lines in Bradford and Leeds. In both cases the omnibuses are few in number, and the earnings, owing to local circumstances, are low. This was anticipated, and it was on this account the general managers, Mr. J. B. Hamilton, of Leeds, and Mr. C. J. Spencer, of Bradford, advised the installation of the railless system. So far as regards working costs their anticipations appear to be fully borne out by the results. In Bradford the cost per omnibus-mile is only 7·286d., while in Leeds, where electric energy is produced at the tramway power-station at 0·493d. per unit, the costs stand at the remarkably low figure of 4·83d. per omnibus-mile. We know of nothing to equal this figure except the costs of operating cable tramway cars on certain routes specially suited to that system. On the Brixton cable line, now converted to electric traction, the costs did not exceed 4·5d. per car-mile.

MUNICIPAL MOTOR OMNIBUS ACCOUNTS, YEAR ENDED MARCH 25, 1914.

Corporations.	Total Capital Expenditure.	Total Receipts.	Working Expenses. Traffic.	General.	Repairs and Maintenance.	Petrol.	Total.	Gross Profit + or Deficit −	Deductions.	Net Surplus + or Deficit −	Total Receipts per 'Bus-Mile.
	£	£	£	£	£	£	£	£	£	£	d.
*BIRMINGHAM	7,515	6,775	1,915	333	1,438	1,406	5,092	+1,683	‡	‡	12·357
†OLDHAM	2,610	1,324	346	362	452	457	1,617	− 293	14	− 307	10·958
ROTHERHAM	2,824	1,894	516	147	229	567	1,259	+ 635	48	+ 598	10·20
SHEFFIELD	8,981	9,127	2,938	296	1,093	1,647	5,974	+3,153	1,882	+1,271	10·20
†WARRINGTON	2,837	2,288	679	182	361	660	1,882	+ 406	71	+ 336	9·281
WOLVERHAMPTON ...	...	2,071	526	64	747	338	1,675	+ 396	30	+ 366	10·244

* Eight months. † Nine months. ‡ Included in Tramway Accounts.

	Working Expenses per 'Bus-Mile. Traffic.	General.	Repairs and Maintenance.	Petrol.	Total.	Per cent. of Operating Expenses to Receipts.	'Bus-Mileage.	Passengers Carried.	Passengers Carried per 'Bus-Mile.	Average Fare per Passenger.	Average 'Bus-Miles per Day per 'Bus.	Working Expenses per Passenger.
	d.	d.	d.	d.	d.	%				d.		d.
BIRMINGHAM	3·492	·608	2·622	2·566	9·288	75·16	131,590	748,500	5·69	2·18	...	1·63
OLDHAM	2·862	2·994	3·738	3·780	13·374	122·13	29,010	304,563	10·81	1·01	30·33	1·24
ROTHERHAM	2·78	·80	1·23	1·97	6·78	66·47	44,579	240,083	5·39	1·88	...	1·26
SHEFFIELD	3·283	·330	1·221	1·841	6·675	65·45	214,796	...	...	...	..	...
WARRINGTON	2·754	·737	1·466	2·679	7·636	82·25	59,154	618,139	10·5	·886	109·14	·73
WOLVERHAMPTON ...	2·603	·317	3·696	1·671	8·287	80·88	48,511	428,704	8·84	1·16	...	·939

SUMMARY OF ACCOUNTS OF RAILLESS TRACTION LINES, YEAR ENDED MARCH 25, 1914.

Corporations.	Route Mileage.	Total Receipts.	Working Expenses. Traffic.	General.	Repairs and Maintenance.	Power.	Total.	Gross Profit + or Deficit.	Total Receipts per Car-Mile.	Working Expenses per Car-Mile. Traffic.	General.	Repairs and Maintenance.	Power.	Total.	Per cent. of Operating Expenses to Total Receipts.	Car-Mileage.	No. of Railless Vehicles.
	Mls.Chs	£	£	£	£	£	£	£	d.	d.	d.	d.	d.	d.	%		
BRADFORD ..	1 21	1,506	637	101	535	234	1,507	— 1	7·281	3·081	·489	2·588	1·128	7·286	100	49,639	3
ROTHERHAM ...		5,757	1,310	409	1,434	658	3,811	+1,946	10·74	2·44	·76	2·68	1·23	7·11	66·20	128,685	...
LEEDS... ...	3 53	2,140	647	65	663	136	1,511	+ 629	6·84	2·07	·20	2·12	·44	4·83	70·61	76,398	4

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MOTOR TRAFFIC.

AUTOMOBILE ENGINEERING AND THE WAR.*

By L. H. Pomeroy, Wh. Ex.

We commence this session with our profession and the industry it supports labouring under the apprehensions arising from the existing state of warfare in Europe. The author is convinced that it is the duty of this Institution to give its undivided and deliberate attention to the present and future of the industry and the lasting benefits which will surely be within its grasp in the near future. We have to realise that not only can we capture a large part of the business previously conducted by our enemy, but that the successful negotiation of the difficult period through which we must inevitably first pass will require all our resources not only of wealth but of scientific and engineering ability. These economical effects will be permanent, and in themselves an important asset.

It is well to remember that this country has an enviable reputation for producing high quality goods of all kinds. Great Britain, in spite of foreign claims, is a land of culture, and because of this, demands a certain exclusiveness of product which is against quantity production on anything like the American scale. For this reason the author thinks that the automobile industry must be content to develop upon the natural lines it has followed here since its inception. Its commercial importance must be based upon a definite superiority of design and execution attained through a constant attitude of healthy discontentedness with things as they are.

It is well known that there are in this country few firms, if any, who produce a motor vehicle completely and entirely from raw material. Quite 50 per cent. of the material composing a motor car is supplied wholly or partly finished by firms who specialise in the various lines of manufacture concerned. A large part of the trade in the separate commodities has been in the hands of Germany and foreign trade rivals, and it is of interest to discuss the principles underlying the successful production of some of the many individual items. It is possible to purchase supplies in this country with a few exceptions equal to anything produced in the world, but only from limited sources.

An example of Continental superiority which stands out before all others is that of the magneto. The Bosch magneto stands in the position which it now occupies for one reason only, and that is, its practical perfection of workmanship. The birth of the high-tension magneto was simultaneous in Great Britain and the Continent. Yet practically all other makes have dropped out but this one. Its prestige is not due to miracles nor to anything which could not have been done here, but to the patient training of labour and the constant aim at perfection of a whole works organised on scientific lines. Whether or not this country has in it the potential ability to make a magneto equal to the Bosch in the time at its disposal the author hesitates to say.

To come to articles directly within the compass of the British suppliers, the author would exemplify the following:

Light stampings of alloy and mild steel for parts subject to shock and alternating stress in which correct heat treatment is a *sine quâ non*.

Heavy stampings, such as back axle casings, front axles, fly wheels, crank shafts, brake drums, tapered steel tubes.

Steel castings, particularly road wheels for commercial vehicles, back axle casings and other large castings where very thin sections are desired.

Pressed-steel parts, such as brake drums, back axle casings, frames, torque members, step irons, etc.

High-tension steel tubes and thin plates.

Electrical insulating materials suitable for moulded forms, and departing from chassis requirements a little, the author would mention the demand for machine tools for special purposes.

To commence with stampings, one of the first difficulties that arises is a financial one, namely, that of payment for dies; this often forms a heavy item of expenditure, which prevents the adoption of stampings. The charges in many cases seem very high, and it is apparently forgotten that once dies are made, the business is, under ordinary circumstances, of a permanent nature.

Stamping or drop forging is an old industry in this country, but there seems to be room for considerable improvement in the methods of stamping. Fig. 1 shows a stamping made in Belgium, which, so far, the author has not been able to obtain here. The chief complaints against British stampers is, first, a lack of knowledge of the physical characteristics of the material they are stamping; second, the tendency to dispense with preliminary hand forging of parts like connecting rods, and to overheat the metal to obtain easy working and quick production; third, a lack of appreciation of how closely to its desired shape a stamping can be made, and consequent non-uniformity of product; and fourth, a complete disregard, in all but a very few firms, of the manifest advantages of heat treatment after stamping in all cases, and its absolute necessity in many.

For the first the steel maker is largely to blame. In trying to eliminate hand work on stampings, it is often forgotten that in the production of a high-class stamping, particularly one of a complicated

Fig. 1.—Striking Fork. Mild Steel Stamping.

Fig. 2.—Striking Fork. Mild Steel Stamping.

nature, the deep forging operation is more of a finishing process than anything else. The author mentions the desirability of stampings being made close to shape, as this affects jig work very largely, and it is astonishing what variation can arise in apparently identical stampings.

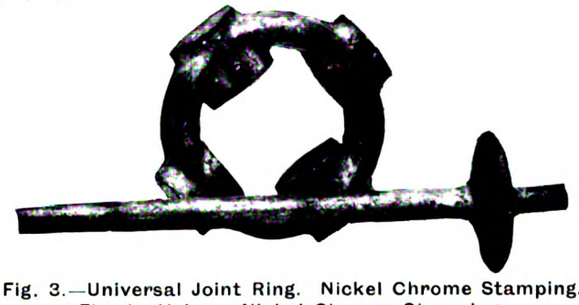

Fig. 3.—Universal Joint Ring. Nickel Chrome Stamping.
Fig. 4.—Valve. Nickel Chrome Stamping.

Last, but far from least, in the general consideration of the desirable qualities of stampings, is that of correct heat treatment. In this connection British firms are deplorably behind those on the Continent. The stamper must join hands with the metallurgical chemist; install

Fig. 5.—Gear Change Lever. Mild Steel Stamping.

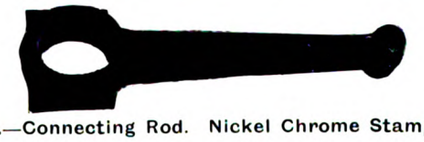

Fig. 6.—Connecting Rod. Nickel Chrome Stamping.

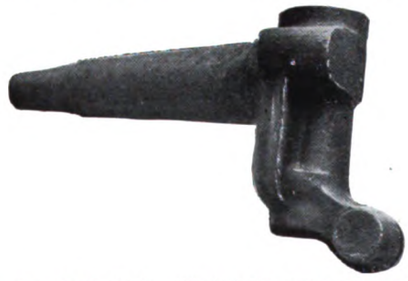

Fig. 7.—Stub Axle. Nickel Chrome Stamping.

the proper plant and appliances for heat treating. The work done in research laboratories for years past on this important matter seems almost entirely neglected by those whose business it is to make use of the information collected and published in the technical press, and the proceedings of our scientific institutions. A point much neglected by designers and stampers is the importance of avoiding sharp corners

* Abstract of paper read before the Institution of Automobile Engineers.

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and fillets. The firms who are prepared to make a bold step will inevitably capture much trade that now goes abroad.

It must not be forgotten that the price of the article supplied has an important effect upon obtaining orders. It is notorious that some firms on the Continent can supply parts at half the price of English makers. The reply of the latter to this criticism is "cheap labour." Personally, the author doubts its correctness. If the American car were produced in Germany the same reply would be made. The author has always found a sort of conservation of labour cost existing in organised labour, *i.e.*, that the productive capacity of the average man is so much below the maximum that his output varies in direct proportion to the wages paid, provided always that the system of remuneration is capable of producing this result. All the cheap labour the author has seen on the Continent has been lazy labour, and the cheapness effect is thus cancelled out.

The point of first importance is output per man in any works, and if the necessary technical equipment can be added to works of high specific production, the author is convinced that Continental prices can be easily approached. The assimilation of this doctrine is one of the duties of every Brirish workman whose future is linked indissolubly with that of the manufacturer. The means whereby specific output or output per man can be increased lie at our hands, amongst others, in the shape of improved factory organisation, conditions of labour, the education of the workman in his imperial responsibilities, and above all the securing of his implicit faith and trust in the class by whom he is employed.

In regard to heavy stampings, such as fly wheels, large hubs, back axle casings, and the like, the present epoch is that of the automatic machine tool, and for its successful use consistency of material is a

Fig. 9.—Rear Hub. Malleable Iron Casting.

Fig. 8.—Rear Hub. Steel Stamping.

sine quâ non. Until the makers of castings approach this ideal to a greater degree than they do at present, the qualities of stampings in respect of easy machining and consistency of texture make them an easy first for popularity amongst works managers.

As to pressings as distinguished from stampings, the field for pressings is enormous. The difficulty from the designing aspect is that of obtaining metal thicker where required than in the body of the pressing. Until thicknesses can be obtained commercially in the order of $\frac{1}{8}$ in. for such a part as a back axle casing, the casting will take a great deal of beating, as, in general, it gives very little trouble indeed owing to the low stresses obtained through the inevitable thickness imposed by casting considerations.

If, however, a stamping can be produced of the same weight as a casting, there will be a decided leaning in its favour, if not outruled by cost, on the ground of ease of machining.

When the field for the supply of malleable iron and steel castings is surveyed, we again become painfully aware of our deficiencies. The modern steel casting is an electric furnace product, and these furnaces were first exploited on the Continent owing to the abundance of cheap electricity, and the solution of the metallurgical problems involved. It is to-day a matter of difficulty to obtain steel castings suitable for automobile work in this country, regardless altogether of price. In particular, steel road wheels are practically unobtainable. The production of a cast wheel in any metal is a matter of difficulty owing to the contraction stresses induced by unequal cooling, and the difficulty is probably greater in casting soft steel than in any other metal. Yet these difficulties have been met and completely overcome abroad with consequent loss of business to this country, and its paralysis in this respect at the moment. The same remarks apply to back axle casings, brake drums, etc.

It is probably again due to the fact that the automobile has been beneath the notice of our leading works until a year or two ago that more progress has not been made. There is a big healthy market for good steel castings that shall be sound, soft, and easily machined, the last two qualities not being identical.

Again, we are up against the bugbear of minimum thickness. The author has tried to get castings of exhaust manifolds $\frac{1}{4}$ in. in thickness and failed. He then put the thickness up to $\frac{3}{16}$ in., and got sound castings; but, unfortunately, upon sawing them up he found the thickness to vary from $\frac{3}{16}$ in. to $\frac{5}{16}$ in., mostly the latter. The expenditure

Fig. 10.—Rear Axle Casing. Malleable Iron or Cast Steel.

of a lot of time and money on the production of very thin castings, say down to $\frac{1}{32}$ in. thick, would be well rewarded.

In considering the possibilities of trade expansion due to the elimination of foreign competition, cylinder castings, ball bearings, and electrical apparatus come to mind. The first two are already in a healthy state, and the equals of anything turned out anywhere, but electrical apparatus, insulating material, high-tension cable, and sparking plugs, to say nothing of the magneto, are all open to criticism.

One other point before we leave the discussion of supplies of raw and semi-finished material. Why do not the firms responsible for the production of such material, which on the average is 50 per cent. of the whole material required in the production of a motor car, place the representation of their goods in the hands of men who know? It is the author's lot to interview many commercial travellers, and he finds that, though there are many who understand the fundamental principles underlying the application of their various goods, the vast majority are hopelessly ignorant of anything outside the information in their firm's catalogue, and are often barely familiar with that. Again, is it unreasonable to expect that these firms shall keep their

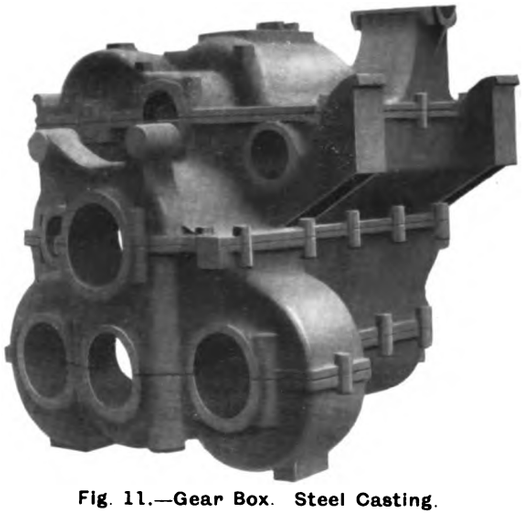

Fig. 11.—Gear Box. Steel Casting.

customers in touch with the tendencies to change which are continually going on in a progressive industry?

For anything like a systematic series of experiments on the automobile, its efficiency and effectiveness, we have to turn to Germany and Prof. Reidler. Such scientific work as has been done here on engines has only been done by men of undisputed authority in the world of physical science, but out of touch with the industry, working on obsolete engines and obtaining results of about as much practical use as the technical

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college tests of its steam engine. We want information not for its use in teaching students to measure accurately, though that is of first importance, but for the suggestion of improvements and for indicating departures in design that shall place the British industry at the head of the world's automobile producers. Now, how can this be obtained with the material at our command? The author would suggest that a com-

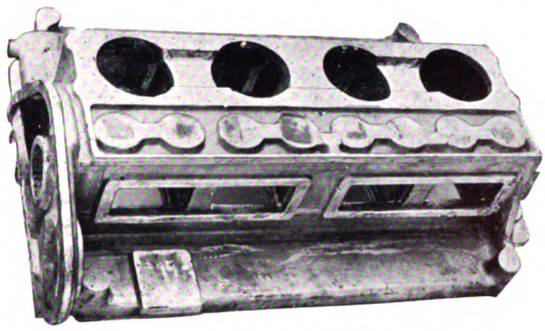

Fig. 12.—Crank Case. Aluminium Casting.

mittee be formed consisting of scientific experts and practical men to consider the question of conducting researches for manufacturers free of charge, so far as these researches are of general interest and benefit.

The subject-matter is infinite, the expenditure required relatively small. The field for investigation is indicated by the fact that the overall efficiency of a motor car on top gear from fly wheel to road is about 65 to 70 per cent. It is our business to get some of this loss back, and it can be done. By pursuing the development of the high-speed engine and the reduction of chassis weight simultaneously, such an improvement can be attained in car design, initiated by this country, as to stabilise our industry and make it unassailable. The author would emphasise the necessity for carrying out such research work upon the lines indicated by industrial necessities rather than those of scientific interest only.

[The author proceeded to indicate lines of research regarding the combustion chamber, the radiator, the carburettor, etc.]

Considering the question of general chassis efficiency we are faced by the fact that all cars are friction driven, and the losses between the friction surfaces, namely, the tire and the road, are very large. In addition, it has been stated by Prof. Reidler that the gear friction loss is almost inversely proportional to the square of the gear ratio, but this certainly seems too high an estimate. If, however, we admit that the gear loss per revolution, say, of the direct-driven bevel gears,

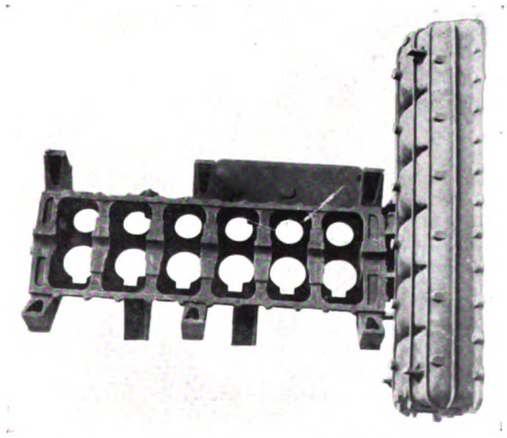

Fig. 13.—Crank Case. Steel Casting.

increases with the speed, we may at once have an artificial limitation of permissible engine speed, since the available torque transmitted to the axle would arrive at a stage when the increase of torque due to reduction of gear ratio would be balanced by the decrease due to loss of efficiency.

If an engine be considered whose torque is constant up to, say, 5,000 revolutions per minute, and giving, say, 100 H.P. at that speed, driving a rear axle with a gear loss varying as the square of the speed, the available horse-power transmitted to the back axle would be, if the gear loss at 1,000 revolutions per minute were 10 per cent.:

at 1,000 revolutions per minute	.	20	–	2	=	18
2,000 „ „	..	40	–	8	=	32
3,000 „ „	..	60	–	18	=	42
4,000 „ „	..	80	–	32	=	48
5,000 „ „	..	100	–	50	=	50

These figures are, of course, extremes, and chosen to illustrate the point under discussion.

We come now to another weapon in our war for commerce which is susceptible of infinite development, the raising of the standard of efficiency of the whole *personnel* of the industry. The old style of foreman and mechanic is rapidly disappearing, and the direction of the detail work of a factory is being driven into the hands of men who are not so intimately in touch with the practical difficulties as they might be, owing to the amount of other kinds of work for which they are responsible. The root cause is that the supply of well-trained men is not in proportion to the needs of the industry. If it is to expand and take advantage of the years that are coming, we must begin now to encourage the apprentices, and develop the raw material in our hands from which the intellectual forces of the future are to come.

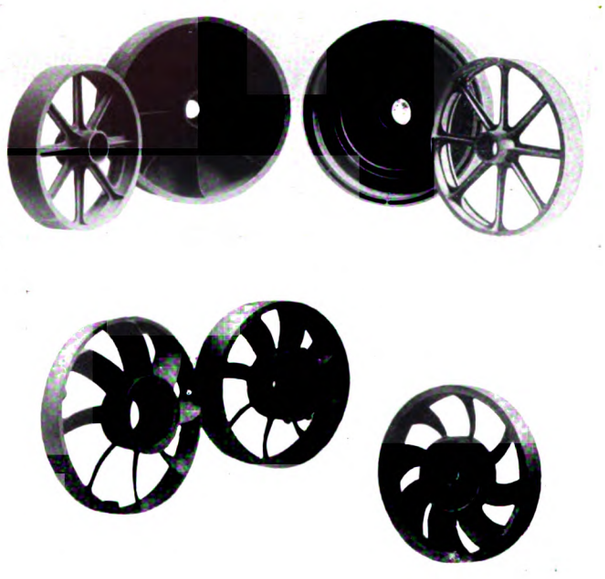

Fig. 14.—Commercial Vehicle Wheels. Steel Casting.

Let those of us, therefore, who have it in our power, start now to impress upon all apprentices the necessity for studying the elements of automobile engineering as taught in our technical institutions through the country. Not only should we emphasise the necessity, but give material encouragement to them in the shape of removing every obstacle to regularity of attendance, of assistance in the matter of fees, and a liberal prize scheme for those who attain even only a moderate standard at the end of the session, provided that they have been diligent. The cost of this to motor manufacturers will be a mere bagatelle, and even as a speculation infinitely more profitable than expenses now incurred in other directions without hesitation. In addition, the apprentice must be taken in hand in the shops, and thoroughly taught his job, and given every opportunity to become a capable mechanic. If this scheme were followed out it would mean that in three to five years from now there would be a supply of trained young mechanics from whose ranks will naturally proceed draughtsmen, foremen, works managers, and designers, if each and all are given every opportunity to develop.

All this may appear visionary, but it is the means whereby Germany has become the commercial rival she was, and will be again when the disturbance caused by the war has passed away. If Germany can then produce better articles than those made by any other country, she will sell them, and if these next few years are allowed to pass without a strenuous effort on the part of our industries to place themselves in a position in which we can compete on equal terms, our opportunity will have been wasted.

The author would again insist that in the reduction of costs which is necessary to maintain our position as industrial competitors of other

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nations, regard must be had to the fact that it will not be possible to achieve this by any lowering of wages of the individual worker; it must be done by increasing his output. It is this factor, output per unit man, that determines failure or success, when other conditions, such as design, are satisfied. The author personally believes in the poiicy of rewarding each man according to his efforts. The payment to all men of a standard rate, irrespective of their productive attainments, seems to him to be futile and obsolete.

But, apart from this question, which most factories have solved in their own way, we have to consider if our shops and their equipments are as well suited as they can be to production at a minimum cost. It is by carefully investigating the whole problem of production as it now stands in our own shops, big and little, that we shall find ample scope for our organising abilities and a fruitful occupation during the period of forced idleness that may be coming. The author doubts if there is a single detail of a car in which, by close investigation, a saving of 50 per cent. could not be effected. It is only necessary to think of time lost through the most elementary defects in shop organisation to realise this.

It may be of service to run over a few of the simple steps which can be taken by each and every shop in the whole industry with immediate and lasting profit, irrespective of the class of work upon which they are engaged. The author would first suggest that the drawing office should be regarded as a department from which all instructions are issued, in which all data are recorded, both relating to design and to the subsequent behaviour of the products, in fact, that nothing should be done in the works or in relation to the product without passing through the drawing office.

On the subject of workshop drawings a paper could profitably be read. There are even now too many shops where the workman has to dig out his particular detail from a mass of others instead of being provided with a drawing giving the particulars relating to the operation upon which he is employed and none other. A close connection between designing and jig offices is conducive to their mutual benefit and to the simplification of design and production generally. If the functions of the drawing office be given full scope, the duties of the works officials become purely executive, as they should be, and they can give their undivided attention to the business of production.

In the shops much can be done in the way of rearranging plant, grouping of all machines of the same kind to allow of easy supervision, and the arrangement of various groups to allow of work passing methodically through the shops without coming back on its tracks. Space, too, is all-important if it can be obtained. The average machine tool costs about 80,000 times more than the ground it stands on, and about 400 times more than the building immediately above and below it. Its productive capacity can be affected seriously by being placed in a cramped and inaccessible position, and, conversely, ample space round each machine tends to method in working and ease of supervision out of all proportion to the slight extra capital expenditure involved.

It now becomes of interest to get some rough idea as to the quantity of business to be acquired by virtue of the fact that the Continent, as a producer of cars, components, and materials, will be impotent for at least two years from now. The author is indebted to a very lucid article in the *Autocar* of October 2nd, 1914, by Mr. Chas. J. Webb, A.I.A.E., for the following statement on the subject of Germany's foreign trade in motor cars. The relative values of the exports of all classes of motor vehicles, chassis and complete cars, both private and industrial, and also motor car parts, from Germany and Great Britain during the past two years, are as follows:

	1913.	1912.
Germany	£4,745,950	£4,044,400
Great Britain	£4,361,480	£3,682,468

German exports of private type cars and chassis:

	1913	1912
No. of cars and chassis exported ..	7,849 ..	7,953
Value of above	£3,548,150 ..	£3,252,800

Of these, Great Britain absorbed 7 per cent. of the total quantity as shown by the weights given in the official returns. If the value be taken as proportional to the weight, the value of the purchases of pleasure cars made by Great Britain in 1913 becomes £248,370, an item which, if modest, is certainly worth having, and as to the acquisition of which there should be no doubt. The value of German exports of motor parts was for 1912, £402,950, and for 1913, £540,300; of these Great Britain took 16 per cent., doubtless largely accounted for by tires and magnetos. The German motor car export trade of a value of £4,000,000 is capable of being transferred to us if we can act quickly, and with due regard to the requirements of the markets we seek to enter.

It is notorious that the German manufacturer spares no pains in the production of catalogues, in making exactly what is required, in the careful packing of his goods, and, in general, exerting every effort to obtain the goodwill of his customer. It is up to us to do likewise.

The author has been unable to find any figures as to the value of Great Britain's motor car production in 1913, but if he may be allowed to hazard what is only a guess upon so important a subject, he would say it was in the region of £12,000,000, so that the trade under discussion is one-third of the total.

It is not, of course, reasonable to assume that all this is going to be transferred to this country. The pleasure car industry, in particular, will suffer a general diminution of business for a considerable time to come, but the commercial industry which had already come into its own will almost certainly develop very largely. It is going to be very difficult for pleasure car makers to cater for the demand for commercial vehicles, not because of the intrinsic engineering problems involved, but because of the temptation to adapt the pleasure chassis for commercial purposes. For light loads the pleasure chassis can be used successfully, but for loads over one ton the heaviest pleasure chassis is defective in many respects.

From the pure design point of view the commercial vehicle has not yet attained much more than the stage of reasonable reliability, regardless of weight, engine power possibilities, and economy. But there are signs that the commercial chassis designers are taking an interest in these latter, and in these directions the pleasure chassis manufacturers' experience should stand them in good stead.

The battle for the "high efficiency" commercial chassis will doubtless follow on the lines of that in the pleasure car industry, and the author can see no reason why the result should not be the same.

Already many firms are building both commercial and pleasure vehicles, and this policy will probably become more widespread during the immediate future whilst the industry as a whole is steadying itself. But sooner or later the *status quo ante bellum* will be restored, and it will be interesting to see how the automobile industry has used its opportunity.

Whatever may happen to Germany politically, industrially it will still possess highly-trained workmen, its asset of scientific industrial research, its patient efficient methods of manufacture and of salesmanship. These are qualities only destroyed by the extinction of a people, and this is not possible. It is not wise or justifiable to count upon any lasting commercial animosity against Germany, and the powers of renaissance of a country and a people after a great war have been shown by France to be phenomenal. So that in the end the battle of commerce will be decided by the relative fitness of the nations concerned to manufacture efficiently just as it has been before.

It is the duty of this Institution and every member of it to use his individual efforts to promulgate in our profession a spirit of efficiency and enterprise which shall, when the time comes, place the issue beyond doubt, and leave the world no alternative in deciding which nation occupies the premier position in all the varied sections of the automobile industry.

"HALLEY'S" MOTORS FOR MUNICIPAL WORK.

Halley's Industrial Motors, Limited, of Glasgow, have taken advantage of another order from Liverpool City Council for eight 6-ton vehicles to forward the following letter to their agents and branches: "The history of our connection with this well-known public body proves, what we have always maintained, viz., that quality tells in the long run. Our orders from the Liverpool Corporation date as under: May, 1910, one tower wagon; October, 1911, one tipping wagon; November, 1911, one tipping wagon; March, 1912, two tipping wagons; September, 1912, four tipping wagons; March, 1913, one tower wagon; September, 1913, two tipping wagons; June, 1914, eight tipping wagons; a total of 20 vehicles.

"It must not be thought that our friends in Liverpool are not keen buyers or that their orders to us have been placed through want of knowledge of the qualities offering in the vehicles produced by our competitors. Every first-class maker has had an opportunity of demonstrating before the Corporation engineers, and quite a few orders for trial machines were given to other manufacturers; in the end however, the decision has been in our favour, and we are justly proud of gaining this further testimony to the quality of our vehicles.

"Liverpool Corporation is not, by the way, the only large civic user of our machines; the Glasgow authorities have given us also most excellent support, having no less than 19 of our vehicles in regular work, and, as in the case of Liverpool, all are of our largest types. The prices of these vehicles range from £600 to £800."

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ROAD CONSTRUCTION TO RELIEVE DISTRESS.

A useful summary of the principal steps taken by the Government for the relief of distress has been issued by the Local Government Board. From this it appears that the Government have urged upon local authorities the importance of mitigating the results of any dislocation of industry, which may have occurred in the district of the local authority by reason of the war, by expediting any scheme of work within the powers of the local authority. The information in the possession of the Local Government Board indicates that the local authorities have responded with readiness to the suggestions made by the Government.

It has been ascertained that during the period between August 4 last and the 21st ult. over 600 applications have been made by local authorities in England and Wales, not being Poor Law authorities, for the sanction of the Local Government Board to the borrowing of money with which to defray the cost of schemes adopted by the local authority. The total amount of the loans desired exceeded £2,500,000. During the same period the Board have sanctioned loans desired by local authorities in England and Wales, other than Poor Law authorities, to the extent of over £3,500,000, as compared with about £1,928,000 sanctioned during the corresponding period of last year.

The Road Board are also rendering valuable assistance to the local authorities of areas in which exceptional distress from want of employment exists. Three large schemes for the construction of new roads, including the new Western Approach Road to London, had been arranged with the local authorities before the outbreak of war. These schemes will be put in hand at an early date. In addition the Road Board have arranged to make grants to an aggregate amount of nearly £450,000 towards works of new road construction and road improvement in many parts of the country, which will involve a total expenditure of about £1,000,000. These grants will be spread over 81 local authorities, and preparations have been made for proceeding with work in each case immediately any exceptional distress from want of employment arises in any of those areas. In regard to 36 areas the Road Board have already arranged, in consultation with the Local Government Board, that road improvement works estimated to cost £203,000, towards which the Road Board are making grants of £85,000, are to be begun at once.

The Development Commissioners have also under consideration some schemes relating to the construction of light railways, the improvement of the navigation of rivers, and other works, in order that work of this character may be ready in case a need for providing further employment should arise.

THE INSTITUTION OF AUTOMOBILE ENGINEERS.

The next meeting of the Institution of Automobile Engineers will be held on Wednesday, November 11, 1914, in the hall of the Institution of Mechanical Engineers, Storey's Gate, St. James' Park, Westminster, S.W., at 8.0 p.m., when Mr. A. Ludlow Clayden and Mr. Harold Burchall will read a paper entitled "Retail Transport," being a consideration of the special problems in connection with household delivery. The authors will deal with the conditions governing the delivery of goods by retail tradesmen and the methods by which those conditions can best be met. They will urge the value of small 5-6 cwt. delivery vehicles in preference to those designed to carry from 20-30 cwt., and will offer suggestions as to the best means of organising delivery services. A cordial invitation is extended to all those interested in this question, whether they are engineers or those interested in the delivery of goods, and cards of invitation may be obtained on application to the secretary of the Institution, 28, Victoria Street, Westminster, S.W.

Mr. J. S. Critchley presided at the meeting of the Institute on October 14, and in introducing Mr. L. H. Pomeroy, the author of the paper entitled "Automobile Engineering and the War," a summary of which is given elsewhere in this issue, said that in the ordinary course he should have been retiring from the chair that evening and introducing their new president, Colonel Holden, but owing to the important military duties that Colonel Holden had been called upon to perform, it was very doubtful whether their new president would be able to attend any of the meetings during the session. The Council had come to the conclusion that it would be very detrimental to the interests of the Institution to drop their meetings, as there were various important reasons why they should try to carry on. The position that the automobile was taking up at the present time was one of vast importance, and it was the duty of every automobile engineer in the country to do his utmost to assist His Majesty's Forces in whatever manner he might be able to. From amongst the members of the Institution there were some 89 who had joined His Majesty's Forces, showing the enthusiasm which existed amongst automobile engineers to assist in every possible way. It was not everyone that could take up positions in the Army, but all those who were constructing automobiles could assist their country by staying at home and attending to their businesses. Their secretary, Mr. Basil Joy, was offered a position in the Army, and he was perhaps a little disappointed that the Council considered it best for him to continue his connection with the Institution, so as to hold it together, as it was easy to find someone else to perform the military duties he was asked to undertake, but it would not be easy to replace him as secretary of the Institution of Automobile Engineers.

MOTOR TRAFFIC NOTES.

MOTOR OMNIBUSES AT ROTHERHAM.—A motor omnibus service has been inaugurated between the Rotherham tramway terminus at Canklow and Catcliffe and Treeton.

SALFORD CORPORATION have dispatched a motor ambulance for service at the front and Mr. Alfred Burton, a Salford resident, has generously offered to replace the machine at his own expense.

LEYLAND MOTORS, LIMITED, have had their tender accepted by the Dunfermline Council for the supply of a 50-H.P. motor fire engine capable of delivering up to 400 gallons of water per minute.

DENNIS TURBINE MOTOR FIRE ENGINE.—The machine illustrated below is the third repeat order for Dennis turbine motor fire engines for the Brisbane Fire Board. This engine has recently undergone successfully the most exhaustive trials organised by Mr. J. Tearoe, the executive engineer for the Queensland Government. The engine is of the 50-H.P. 300 gallon type, fitted with 50-ft. sliding carriage escape, and 40-gallon first aid tank. Messrs. Dennis supplied their first engine

to the Brisbane Fire Brigade in 1911. The repeat orders which have followed clearly prove the satisfaction which this type of machine has given. Superintendent Hinton, the local fire chief, has written in high praise of the satisfactory work of his Dennis equipment.

ELECTRICAL VEHICLE PROGRESS.—Mr. H. Thompson Lee, electrical engineer of Wimbledon, has been instructed by the Council to draw up a report as to the desirability of adopting electrically-propelled vehicles.

PRESENTATION OF MOTOR AMBULANCE TO THE AUSTRALIAN FIELD FORCE.—The municipality of Camberwell, Melbourne, have presented the Australian expeditionary force with a fully equipped motor ambulance.

HALLEY'S INDUSTRIAL MOTORS, LIMITED, inform us that although they are extremely busy in their efforts to keep pace with the War Office demand for their heavier type machines, owing to the recent large extensions to their works at Yoker they are now able to give prompt delivery of their 1½-ton, 2-ton, and 2½-ton models.

TRACKLESS TROLLEY CARS IN SOUTH AFRICA.—Transvaal newspapers just to hand contain reports of the opening of a trackless trolley route on the Cedes system at Germiston. The inaugural ceremony was presided over by the Mayor (Mr. H. Henderson), and representatives of Bloemfontein, Pretoria, and Johannesburg also attended.

BIRMINGHAM MOTOR OMNIBUSES.—At a meeting of the Tramways Committee the manager, Mr. A. Baker, reported that the Corporation had taken over the motor omnibuses in Birmingham from the Birmingham and Midland Motor Omnibus Company at midnight on Saturday, October 17, and the Corporation were now running them.

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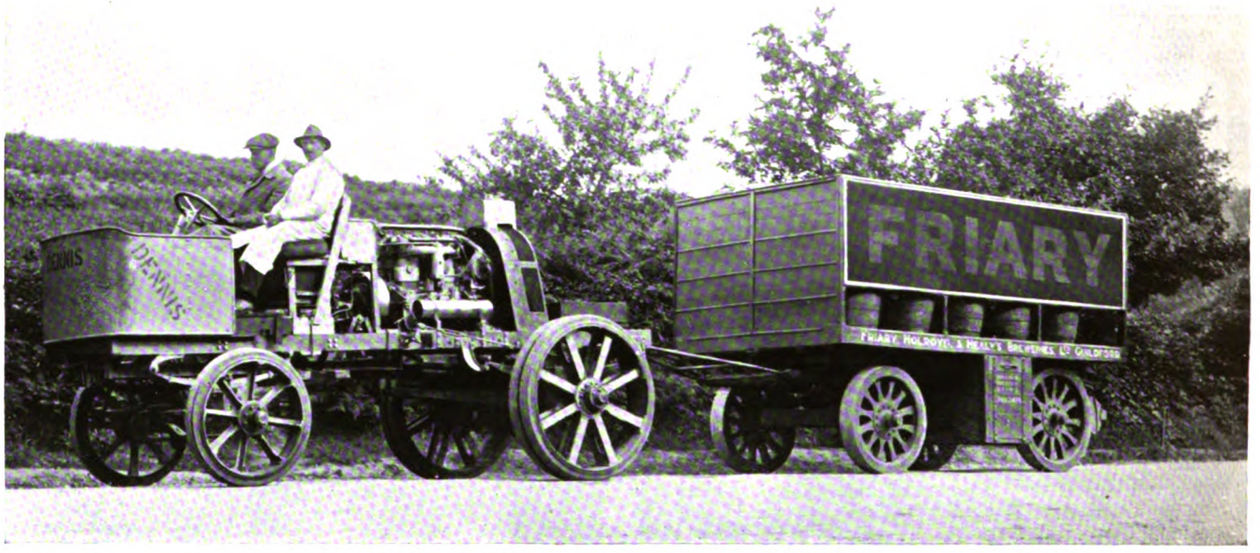
STORAGE OF PETROL AT OLDHAM.—The Tramways Committee of the Oldham Corporation are considering the advisability of installing an underground system of petrol storage as they are now using upwards of 30,000 gallons of petrol per annum, and with the extension of the motor services now contemplated this will be largely increased in the near future.

PETROL-ELECTRIC TURNTABLE LADDERS.—Tenders were invited during the recess of the London County Council from W. A. Stevens, Limited, of Maidstone, and the Railless Electric Traction, Limited, for the supply of two petrol-electric chassis to carry Magirus ladders. W. A. Stevens' offer to supply the two chassis required at £762 each was accepted.

W. A. STEVENS, LIMITED, inform us that a large number of the Tilling-Stevens petrol-electric vehicles are now passing through the works at Maidstone. Amongst the latest orders to be put in hand are machines of various types for the following public services: Falkirk and District Tramway Company, London Fire Brigade, Worthing Motor Services, Limited, and Messrs. J. Chapman and Sons, Eastbourne.

TRACTOR FOR SOUTH AFRICAN RAILWAYS.—The Dennis tractor illustrated on this page was specially designed and constructed to the requirements of the South African Government Railways. This machine will haul 9 tons at 12 miles per hour, and has performed exceptionally well during its trials. It is the first tractor of its kind, and the arrangement, which is unusual, is adapted to meet the proposals of Mr. W. W. Hoy, general manager of the South African Railways, who, in a contribution to the Imperial Motor Transport Conference of 1913, expressed his great faith in the suitability of the internal combustion tractor for South African conditions.



Tractor for South African Government Railways.

MOTOR OMNIBUSES IN MELBOURNE.—Melbourne has now 31 motor omnibuses in daily service. These are operated by three distinct companies, and include 18 of the London General B type run by the Melbourne Motor Omnibus Company Limited, 12 Tilling-Stevens petrol-electric machines run by Motor 'Bus Services Limited, and one 40-H.P. Karrier omnibus supplied by Messrs. Clayton and Company, of Huddersfield, to the Victorian Motor 'Bus Company Limited. All these are of the double-deck type with seating accommodation for 34 passengers.

LONDON OMNIBUSES AND THE WAR.—The constant demand which is still being made by the Government upon the resources of the London General Omnibus Company is having its effect upon the various services, which now show a decided weakening in all directions. We understand that some hundreds of machines have been taken out of service during the past few weeks and dispatched abroad to serve as army transport vehicles. As the output of the company's works at Walthamstow is also being taken by the War Office, it is quite impossible to replace these vehicles for the time being. By the skilful arrangement of timetables, however, the public convenience is interfered with as little as possible, most of the serious curtailments being upon the routes where other services are available.

ACCOMMODATION FOR LONDON COUNTY COUNCIL MOTOR LORRIES.—The London County Council on April 7, 1914, decided to purchase eight motor lorries for use in the permanent way section of the tramways department. Covered accommodation in the depot for lorries used in connection with the southern section of the system was already provided, but similar provision had to be made for the northern section. The Council has now approved a recommendation of the Highways Committee that accommodation for motor lorries at the Leven Road, Poplar, and the Leighton Road, Kentish Town, permanent way depots should be provided, at a cost of £2,825.

OMNIBUSES FOR SOUTHAMPTON.—The deputation which recently inspected certain vehicles, reported in favour of the Tilling-Stevens and Thornycroft types. In their report the deputation stated that users of the Tilling-Stevens type found that the maintenance of the electrical apparatus was negligible, and as the construction of the armatures is almost identical with that of the tramway motor, no difficulty would be experienced in dealing with any repairs by the existing staff. Under the special circumstances, therefore, the Tramways Committee was recommended to obtain quotations from the two firms mentioned for omnibuses fitted with single-deck bodies. The committee has, however, deferred the consideration of the whole subject for the present.

A CENTRAL TRANSPORT EXCHANGE.—A large number of firms are at the present moment in difficulties owing to their horses or motor vehicles having been requisitioned for military service. Many others find it impossible at present for them to find good use for their vehicles or horses. The Imperial Motor Transport Council has opened at 173, Fleet Street, London, E.C., a central transport exchange for the purpose of bringing those who are short of delivery facilities into touch with those who are short of work for their vehicles for the time being. A considerable number of inquiries have already been dealt with, and a number of firms put into touch with others who are prepared to hire or buy their vehicles. All inquiries should be addressed to Mr. Horace Wyatt, hon. sec., Imperial Motor Transport Council.

ELECTRIC OMNIBUSES FOR YORK.—At the October meeting of the City Council, Alderman Meyer, in supporting the recommendation of the Electricity and Tramways Committee for the purchase of four electric omnibuses, said that the intention of the committee was to carry out the tramway extensions for which power was obtained in the Corporation's bill, but they wished to test the routes by means of electric omnibuses before proceeding with the tramway construction. They were not giving up the powers for tramway construction, but they intended to test the earning power of the routes, and he believed the vehicles now ordered would admirably serve the purpose. Councillor Sessions said that the electric omnibuses would cost £350 per vehicle more than the petrol omnibus, but they had the testimony of the tramway manager at Southend that the electric omnibus could be run at less cost than the petrol omnibus.

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THE

Tramway & Railway World

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Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

COUNTY BOROUGH OF WALSALL.

HIGH TENSION CABLES.

The Walsall Corporation invite tenders for the supply, delivery and erection of extra High Tension Cables.

Copies of the specification, formal conditions, etc., may be obtained upon application to the Consulting Engineer, Mr. E. M. Lacey, M.Inst.C.E., 12, Victoria Street, Westminster, London, S.W., on payment of three guineas, which will be returned on receipt of a *bona-fide* tender.

Extra copies of the specification and quantities may be obtained on payment of half a guinea, which will not be returned.

Tenders, sealed and endorsed on the outside "Tender for Electricity Works, Contract No. 7," to be addressed to the Town Clerk, Walsall, and delivered not later than 10 a.m. on Tuesday, November 17, 1914.

The Corporation do not bind themselves to accept the lowest or any tender, and they will not accept the tender of any firm or person paying less than the standard rate of wages to their workmen.

By order, HERBERT LEE,
Town Clerk.

Council House, Walsall,
November 3, 1914.

MUNICIPAL COUNCIL OF THE CITY OF PORT ELIZABETH.

ELECTRICITY SUPPLY.

The undersigned are prepared to receive tenders for the supply of the following Material in connection with the Corporation Electricity Supply Undertaking :—

Section "A." Engine Room Plant.
Part 1. Turbo-Generators.
Part 2. H.T. Switchgear.
Part 3. Converting Plant.

Section "B." Boiler House Plant.
Part 1. Boilers.
Part 2. Coal Conveyor.

Section "C." E.H.T. and Telephone Cables.

Tenderers are at liberty to tender for any one or for all the complete parts, but not for a portion only of any one part.

Copies of the specifications, with terms and conditions, forms of tenders, form of contract, and reduced general plan and section of works, may be obtained from the undersigned on making a deposit of £5 (five pounds), which sum will be refunded on the return of the specification filled up with a *bona-fide* tender. Extra copies of the specification, etc., may be obtained by *bona-fide* tenderers at a charge of 10s. (ten shillings) per copy, which will not be refunded.

Tenders, sealed and marked "Tender for Electrical Plant, Section —," must be delivered to the undersigned before noon on Thursday, November 26, 1914.

The Municipal Council does not bind itself to accept the lowest or any tender.

DAVIS AND SOPER,
Agents of the Municipal Council of the City of Port Elizabeth.

54, St. Mary Axe, London, E.C.,
November 2, 1914.

BOROUGH OF BOOTLE.

SUPPLY OF PETROL MOTOR AMBULANCES AND VANS.

The Corporation invite tenders for the supply of two Petrol Motor Ambulances and two Bedding Vans to fit the Chassis.

A copy of the specification and form of tender may be obtained from the undersigned.

Tenders, addressed to the Chairman of the Health Committee, and endorsed "Tender for Ambulances," to be delivered at the Town Hall, Bootle, on or before Saturday, 21st November, 1914.

The Corporation do not bind themselves to accept the lowest or any tender.

By order, J. SPENCER TUMILTY,
Town Clerk.

October 26, 1914.

URBAN DISTRICT COUNCIL OF DARTFORD.

ELECTRICITY DEPARTMENT.

The Council invite tenders for the following work at the Electricity Works, Dartford :—

(1) The Extension of Steam, Exhaust and other Piping; and
(2) The Extension of High Tension Cubicles, Control-Board and Cabling.

Copies of specification and form of tender may be obtained from the undersigned on payment of a deposit of one guinea for either section, which will be returned on receipt of a *bona-fide* tender.

Tenders, in sealed envelopes, endorsed "Tender of Work at Electric Power Station, Section....." must be delivered at the Council Offices, Dartford, not later than noon on November 18.

The Council do not bind themselves to accept the lowest or any tender.

W. KAY,
Clerk to the Council.

Council Offices, Dartford,
November 3, 1914.

SOUTH INDIAN RAILWAY COMPANY, LTD.

The South Indian Railway Company, Limited, are prepared to receive tenders for the supply of :—

No. 1.—Springs, Laminated, Volute and Helical.
No. 2.—Copper Plates and Rods for Locomotive Fire-boxes.
No. 3.—Brass Boiler Tubes, 96,000 lb.
No. 4.—Steel Boiler Plates.

Specifications and forms of tender may be obtained at the Company's Offices.

Tenders, addressed to the Chairman and Directors of the South Indian Railway Co., Ltd., marked "Tender for Springs," or as the case may be, must be left with the undersigned not later than one o'clock on Wednesday, November 11, 1914.

A charge, which will not be returned, will be made of 20s. for each copy of the specifications.

Copies of the drawings may be obtained at the office of Robert White, Esq., M.Inst.C.E., Consulting Engineer to the Company, 3, Victoria Street, Westminster, S.W.

By order, V. E. DE BROE, M.Inst.C.E.,
For Managing Director.

Company's Offices,
91, York Street, Westminster, S.W.,
October 27, 1914.

POSITIONS VACANT.

JUNIOR ENGINEERS.

Cleveland and Durham Electric Power, Limited, have vacancies for Junior Engineers. Applicants should have had preferably Mechanical and Electrical experience, and should be about 21 years of age. Applicants successful, after one month's trial, will be required to sign an agreement for at least 12 months, and will be given experience in three-phase and direct-current sub-stations (or electric railway sub-stations) and in coal-fired and waste heat power stations. Selections for higher appointments follow real ability. Remuneration 25s. per week for first year.—Apply, with full details of experience and testimonials, to the MANAGER, Hintons' Buildings, Middlesbrough.

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COUNTY BOROUGH OF SWANSEA.

ELECTRICITY DEPARTMENT.

Applications are invited for the position of Charge Engineer. Commencing salary £115 per annum, rising by annual increments of £7 10s. to a maximum of £130 per annum.

The systems of supply are three-wire continuous current three-phase 6,000 volts, and traction; and the plant consists of reciprocating engines, turbines, water-tube and Lancashire boilers.

Preference will be given to candidates with experience of similar systems and plant.

Applications, endorsed "Charge Engineer, Electricity Department," stating experience, age, and accompanied by copies of three recent testimonials, to be sent to the undersigned not later than noon on Tuesday, the 17th instant.

H. LANG COATH,
Town Clerk.

Guildhall, Swansea.

COUNTY BOROUGH OF BURTON-UPON-TRENT.

CHARGE ENGINEER.

Wanted (during period of war), Charge Engineer for High-Tension 3-phase Power Station, with experience in Engine Room and Boiler House work.

Wages £2 5s. per week.

Applications giving full particulars of technical training and experience, together with testimonials, should reach the undersigned not later than Thursday, November 12, 1914.

THOMAS HALL,
Borough Electrical Engineer and Tramways Engineer.

Electricity Department,
Guild Street, Burton-upon-Trent.

JUNIOR ASSISTANT ELECTRICAL ENGINEERS.

The Newcastle-upon-Tyne Electric Supply Company, Limited, require young men over the age of 19 years, who have had some electrical training, for positions of Junior Assistant Electrical Engineers for Power Station and Sub-station work.

A two years' agreement will be entered into and the remuneration will be 15s. per week for the first year and 20s. per week for the second year.

On the completion of the agreement excellent opportunities occur for rapid advancement in various branches of the Company's business.

Applications, stating age, to be addressed to the ENGINEER, Carville Power Station, Wallsend-on-Tyne.

SEND YOUR ENQUIRIES FOR
Insulating Materials,
Brass, Iron, and Copper Stampings, and General Supplies
TO
JOSEPH THOMPSON,
COLUMBIA WORKS, 106, Eyre Street, SHEFFIELD.
Telegrams: "Insulator, Sheffield."
Engineers' Specifications worked to.

TRAMWAY SUPPLIES, Ltd.,
Tramway Engineers,
Sole Selling Agents for S. Dixon & Sons' Tramway Material,
160, WOODHOUSE LANE, LEEDS.
Sole Manufacturers of
TURNER'S PATENT AUTOMATIC POINT CONTROLLERS.
Telegrams: "Controllers, Leeds." Telephone: 2498 Leeds.
OVERHEAD LINE MATERIAL AND SUPPLIES.

POLE PAINTS
which keep their colour and prevent rust. Kearsley's ready-mixed Pole Paints are used by important Tramway Companies the world over, and give entirely satisfactory results under extreme climatic conditions.
Robert KEARSLEY & Co., Ltd.
RIPON, England.

MILLARS' TIMBER AND TRADING CO., LTD.
PINNERS' HALL, GREAT WINCHESTER STREET, LONDON, E.C.,
beg to inform their Customers that the War has not interfered with their production of
JARRAH for Wood Paving,
and they are in a position to give prompt deliveries from stocks in this country.

SPECIAL
Car Varnish
for finishes of great durability and brilliant lasting lustre.
Sole Manufacturers:
PINCHIN, JOHNSON & Co, LTD.,
Minerva House, Bevis Marks,
LONDON,
E.C

THE BRITISH ACKLEY BRAKE AND SUPPLY CO., Ltd.,
WESTINGHOUSE BUILDINGS, NORFOLK STREET, LONDON, W.C.
Sole Licensors for the Manufacture of the Ackley "Adjustable" and "No Staff" Brakes in the United Kingdom, Norway, Sweden, Denmark, Belgium, Holland, and certain other territories.
The British ABC TRADE MARK London.
Ackley Adjustable Brake.
Patented in all Countries. British Patents issued in 1903, 1909.
Quick Operation. Powerful Application. Easy Installation.
Correspondents: ACKLEY BRAKE CO., 50, CHURCH STREET, NEW YORK
Deutsche Ackley Bremsen Co., m.b.H. Charlottenburg 4-Berlin, Waitzstr. 7.
Cie. Francaise des Friens Ackley, 62, Rue St. Lazare, Paris.
BRANCH OFFICES AND AGENCIES Established at Brussels, Christiania, and Stockholm.

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THE
Tramway AND Railway World

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THE TRAMWAY & RAILWAY WORLD PUBLISHING CO., Ltd.,
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One Shilling per Single Copy.
FOR ALL PLACES ABROAD—Thirty Shillings per Annum.

SATURDAY, NOVEMBER 7, 1914.

THE "OCEAN"
ACCIDENT AND GUARANTEE CORPORATION, LTD.,
IS THE
PREMIER INSURER OF TRAMWAYS
HEAD OFFICE:
MOORGATE STREET, LONDON, E.C.

THE ELUSIVE OMNIBUS PASSENGER.

In our issue of October 10 last, under the heading "The Missing of Passengers," we dealt generally with the question of the difficulty of getting all drivers and conductors to keep a good look-out for possible passengers, and pointed to the advantages to the public and to the revenue of the undertaking if the missing of passengers could be reduced to the lowest possible limit. The remarks then made referred for the most part to tramways, but the subject is probably even of greater importance in connection with motor omnibuses, seeing that they are of smaller carrying capacity and that the margin between revenue and working expenses is often very narrow. The working of motor omnibuses both by local authorities and by companies is rapidly developing in this country, so that the problem of increasing the average revenue per mile run is one of great and growing importance. London was the birth-place of the motor omnibus. In the metropolis this vehicle is used to a greater extent than anywhere else, and it is there that many of the questions associated with its employment can most profitably be studied. In what follows we deal specially with London conditions, in the hope that any deductions that can be drawn therefrom will be of service to those responsible for the operation of motor omnibuses in other parts of the country. With the changed traffic conditions now prevailing in London, owing to the war, it is extremely difficult to gauge even approximately the average possible revenue of an omnibus journey. In normal times so accurately were details of the records of the various routes compiled that it has always been practicable for the omnibus companies, right back to the old horse days, to detect the negligent conductor and take the necessary steps to impress upon his mind the fact that the profits of the Company were dependent on the number of passengers carried and not on the rapidity of the journey. It is possible, therefore, that the slackness which is now very apparent is due to the knowledge of the difficulty of detection on the part of the omnibus men, or it may be due to the fact that the large number of new men now on the road have not yet realised that their duties consist of something more than running their vehicle from one end of the route to the other in a given number of minutes and collecting the fares of the favoured ones who succeed in obtaining a seat at one or other of the points where recognised stopping places are situated. A certain advantage which the motor omnibus has over the tramcar is that it may be stopped when and where required by the travelling public, so that it is obvious that if by the failure of the company's servants to respond to the signals of intending passengers traffic is lost, the efficiency of the system from a public service point of view is more or less reduced, to say nothing of the financial loss to the companies at a time when the missed passengers may make all the difference between profit and loss. That traffic is being lost daily from this cause there can be no question; one has only to question any person whose business necessitates the constant moving about on the principal omnibus routes to be assured on the point, and also to learn something of the irritation caused by this inattention on the part of the companies' servants. It is true that in the main thoroughfares of London, where there is such a mass of general traffic, there is a greater chance of missing passengers than there is in most other towns. Tramway experience, however, has shown that the ignoring of would-be passengers is quite easily done in towns of very moderate size. It therefore behoves every one responsible for the running of motor omnibuses to take strong steps to prevent the evil. Outside of London such undertakings are as yet on a comparatively small scale, and therefore it should be the easier to put things right with a view to keeping them right as the undertakings develop.

THE PURCHASE OF BRISTOL TRAMWAYS.

MR. ALFRED DICKINSON'S ESTIMATE OF AWARD UNDER THE "THEN VALUE" CLAUSE.

The opposition in Bristol to the scheme of the Corporation for the purchase of the tramway undertaking of the Bristol Tramway and Carriage Company promises to gather strength. It will be remembered that the Corporation obtained an Act passed in last session of Parliament, giving them power to work the undertaking when purchased. Messrs. E. Gerrish, Harris and Company, who acted for the petitioners against the Bill when it was before the House of Commons, have sent a letter dated October 29 to the petitioners. In this letter it is stated that "disregarding the doubtful character of the speculation and the impossibility of raising money except upon most onerous terms, the municipal trading party in the Council still intend to try and force a purchase on the city. It is necessary therefore to be prepared to continue to offer the strongest possible opposition, and with this object an influential committee is being formed consisting of those owners and ratepayers who petitioned against the Bill and also a number of other important ratepayers whose signatures to the petition it was not possible to obtain in the short time available."

Appended to this letter is a report by Mr. Alfred Dickinson, the expert who was retained on behalf of the opposition to the Bill. In this report he says that his experience shows that the 43rd section of the Tramways Act, 1870, is not so advantageous to the purchasing local authorities as an actual reading of the clause would seem to imply. The principle laid down in section 43 is that the purchasing authorities have the right to acquire the tramways on their "then value." Taking as an example the power station of the Bristol Tramways Company, which was built in 1900, Mr. Dickinson points out that the plant consists of slow speed compound vertical condensing engines, direct coupled to generators. When installed this was a most up-to-date plant, but modern invention has superseded this type of plant by turbo-generators. These are now the practice, and horse power for horse power cost, say, one-half of that of the plant of the Bristol tramways. Notwithstanding this fact, if the Corporation acquire the undertaking the price which will have to be paid is what it would cost to instal the identical original plant now in the power station.

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As the type of plant installed is not now being manufactured, to put it in at the present time would cost more than it did originally. The increased cost may very well equal the depreciation on the plant, so, if the Corporation acquire the tramways, they will have to take over a power station at a cost largely exceeding the present cost of installing a power station equipped with modern plant.

Mr. Dickinson is satisfied that the undertaking has been maintained in a most thorough manner. That being so, the depreciation is small; therefore, coupled with the fact that the cost of installation now would be very high owing to the present price of labour and materials, an award must be for a very large sum. Having examined all the circumstnces he is of opinion that the award will be approximately £1,215,000. The sum required to pay off that amount in 25 years on the basis of the 3½ per cent. table is £31,193. Interest, also, will have to be paid, and taking the most favourable view and assuming the Corporation's own figure of 3.9 per cent., the annual charge for interest would be £47,385, making with the sinking fund £78,578. With the traffic available in Bristol, such an annual charge would, under the most favourable circumstances, be serious, but with an extensive, efficient, and increasing motor 'bus competition the profits on the working of the tramways would be insufficient to meet it.

The tramways are efficiently and economically worked at present, and Mr. Dickinson is satisfied that if they were purchased and worked by the Corporation the revenue could not be increased nor could a better service be given, nor the tramways worked at less cost than at present. Having examined the figures available and made allowance for revenue and expenditure on the motor omnibus part of the company's undertaking, Mr. Dickinson arrives at an annual deficit of £26,839 without making any provision for depreciation. He next takes into view the effects of motor omnibus competition, and assuming that it reduces the traffic receipts of the tramways only to the extent of 10 per cent. the position would be as follows :—

	£	£
Gross earnings of Tramways	225,556	
Less 10 per cent. due to motor 'bus competition ...	22,555	
		203,001
Working Expenses		173,817
Available balance		29,184
Sinking fund and interest on £1,215,000		78,578
Deficit (without having made any provision for depreciation)		49,394

Advocates of purchase may suggest that the estimate of present value put forward by the advisers of the Corporation, viz.—£670,000, is the more correct figure to take as a basis of the results to be anticipated.

Adopting this figure of estimated value for the moment, the financial position would be as follows :—

	£	£
Gross earnings of Tramways	225,556	
Less 10 per cent. due to motor 'bus competition ...	22,555	
		203,001
Working Expenses		173,817
Available balance		29,184
Sinking fund and interest on £670,000 on same basis as previously taken		44,001
Deficit (without having made any provision for depreciation)		14,817

The before-mentioned deficits of £26,839, £49,394, or £14,817, as the case may be, will have to be provided out of the city rates, and a 1d. rate in Bristol produces about £7,000.

There is no case where a local authority has purchased such a complete, splendidly-equipped, and thoroughly maintained electric tramway as is the Bristol system. And Mr. Dickinson knows of no case of any local authority having purchased a tramway undertaking where there was already an organised system of motor omnibuses owned and worked by the Tramway Company.

Having regard to the great probability that the figure of capital cost assumed by the Corporation for the acquisition of the tramways will be largely exceeded, that the working expenses will be higher than put forward, that with motor 'bus competition the revenue would be decreased, and to the possibility of further improvements in motor omnibus traction, it is his opinion that the Corporation would be well advised in postponing the exercise of their option of purchase.

This course has the merit of avoiding immediate losses and will enable the Corporation to judge the effect of probable developments of other forms of streets traction upon the future of electric tramways.

Mr. H. F. Cooper, secretary of the Bristol Tramway and Carriage Company, has written to the local press, stating that his directors have read Mr. Dickinson's report and have considered that his approximate estimate of the value of the company's undertaking by no means represents the true value. The company's advisers placed the value at a sum exceeding by some hundreds of thousands of pounds Mr. Dickinson's value of £1,215,000.

L.C.C. TRAMWAY MATTERS.

Very little tramway business was dealt with by the Council at its meeting on Tuesday. Owing to the war all new work has been postponed as far as possible and consequently only routine matters are being dealt with, so that the reports from the Highways Committee are less numerous than usual.

CONSTRUCTION OF TRAMWAYS IN EAST HILL, WANDSWORTH.

The Highways Committee reported that they had under consideration arrangements for the construction of tramways in East Hill and High Street, Wandsworth, which have already been authorised. At the present time it is possible to deal only with the portion of the route from the existing tramways in East Hill to a point near Fairfield Street, and the Committee recommended that this portion should be put in hand at an early date, and that tenders should be invited from selected firms only, as the total expenditure involved is comparatively small.

PAYMENT FOR PIPING IN GREENWICH STATION.

The Council on January 20, 1914, accepted the tender of the Brightside Foundry and Engineering Company, Limited, amounting to £5,438 15s. for the supply of steam, exhaust, condenser, feed, etc., piping required for the Greenwich generating station. The contract provides for payment of 50 per cent. of the contract price (less provisional sums) when the whole of the work has been delivered at the station, and a further 25 per cent. after the whole of the work has been erected. The company is prevented from completing the work under the contract owing to the non-delivery of the second of the new turbo-generators. In these circumstances payment on account of £1,248 was, during the recent summer recess, authorised to be made to the company, this amount representing 50 per cent. of the value of the work delivered at the station, but not then erected, and 75 per cent. of the work delivered and erected at the station. Further work under the contract has now been delivered and partially fixed, and, on the basis mentioned above, a further payment of £1,343 can be made to the company. The Highways Committee recommended that this should be done, and that the same course should be followed for a period of one month, at the end of which time the matter should receive further consideration.

The recommendations were approved.

MISCELLANEOUS NEWS AND NOTES.

Hull Extensions.—Hull Tramways Committee have resolved to apply for a Provisional Order to enable them to carry out certain extensions of the tramways.

Concession for a Tramway in Spain.—The "Board of Trade Journal" states that a concession has been granted to Don José F. Solorzano y Frure for the construction of a tramway from Ferrol to Santa Maria de Neda.

Birmingham Motor Omnibuses.—It has been found necessary to re-arrange some of the motor omnibus services in Birmingham, and to suspend others temporarily, owing to a number of the vehicles having been requisitioned by the War Office.

Tramway Extension in Bury.—At a special meeting of Bury Town Council on October 29 it was agreed to approve of the intended application to the Board of Trade for a Provisional Order to enable the Corporation to construct additional tramways.

Recruiting at the British Westinghouse Works.—Over 900 men have left the British Westinghouse Company to join either the naval or military forces. The works are on full time and certain reductions in salaries which were made at the opening of the war have now been returned.

The Coventry Chain Co., Ltd., Spon End, Coventry, inform us that 130 of their employees have rejoined the colours or enlisted since the beginning of the war. They hope to reinstate all those who re-apply at the conclusion of hostilities. The company are paying reservists' wives 7s. per week, and 1s. for each child.

The International Electrical Congress, San Francisco.—The *Electrical World*, of New York, states that there is every probability that the International Electrical Congress, which it was proposed to hold in connection with the Panama-Pacific Exhibition at San Francisco next year, will be postponed on account of the war.

Mexican Tramways Company.—The London Office of the Mexico Tramways Company have received advice that the intervention of the Mexican Government in the affairs of the company is likely to continue for an indefinite period, and that it is rumoured that the Government intend to appoint a commission to study the company's franchises.

Children's Fares on London United Tramways.—The London United Tramway Company have granted a valuable concession in the form of halfpenny fares for children under 12 years of age. The cheap tickets are issued between 8.30 a.m. and 5.30 p.m., except on Wednesdays and Saturdays, when cheap tickets are issued up to 2 p.m. only.

Illuminated Car in Huddersfield.—A brightly illuminated car with several hundred lights is now being used in Huddersfield for the purpose of aiding recruiting for the Territorials. The sides of the car have as illuminated mottoes, "Your existence is at stake" and "Your country needs you." On the top at each end of the car fly the flags of the Allies.

The British Thomson-Houston at the Front.—The British Thomson-Houston Company have recently received the following telegram from their agents in Melbourne regarding the result of the recruiting at the British Thomson-Houston works :—"Congratulations your sending over nine hundred fighters to front. We are proud of them. God-speed and victory." The telegram is based upon a notice of 900 recruits, but this has now been increased to considerably over 1,000.

Lancashire and Cheshire Municipal Tramway Managers' Association held a meeting at the Victoria Hotel, Manchester, on Friday, October 30, when the following were present:—Mr. Alderman Linsley (President M.T.A.); Messrs. W. Clough (Bury) in the chair; J. Barnard (Bolton); J. W. Dugdale (Oldham); J. S. Hosken (Darwen); H. Pilling (Accrington); F. Schofield (Stalybridge); J. F. Simpson (Preston); C. L. E. Stewart (Rawtenstall); and G. W. Holford (Salford) honorary secretary. Various matters of interest were discussed. The members learned with much regret of the death of Lieutenant Brockman, R.N., who escorted them over the dockyards when they visited Plymouth a few months ago.

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The J. G. Brill Company, 110, Cannon Street, E.C., announce that they are one of the few concerns at the present time holding large stocks of woven cane for tramway and railway carriage seats. This can be supplied both lined with canvas and unlined. The shortage in the usual supplies finds them well equipped for executing orders for this material.

A Tramway for Aden.—According to the *Times of India*, a proposal is on foot to construct a tramway at Aden, which will be twelve miles in length. It is calculated that the working of such line would encourage people to live outside the town in a suburb, and would relieve the overcrowding in Aden itself. A detailed project is to be drawn up, and there is a proposal to adopt Simplex petrol motors for the cars, such as have been employed so successfully in Karachi.

Rotherham Town Council propose to seek powers in the next session to provide for the compulsory through running of cars between Sheffield and Rotherham. The bill will also include proposals for the doubling of certain tracks, the running of motor omnibuses, and to authorise the Chairman of the Parliamentary Committee and Alderman Winter to negotiate with the West Riding County Council with a view to obtaining their consent to the construction of the proposed tramway over their roads.

Opposition to Tramway Extension in London.—The Westminster City Council, after reconsideration, have adhered to their decision to withhold their consent to a scheme of the London County Council to construct a tramway along Victoria Street for the purpose of connecting the line at Westminster Bridge with the line at Victoria Station. In this action the Westminster Council are following the same course as has been adopted by certain other road authorities in connection with the scheme of the County Council for linking up existing tramway lines.

Dearne Valley Light Railways.—This light railway scheme, which, as already reported, has been finally approved by the Light Railway Commissioners, provides in the form in which it has been passed for the construction of about 16 miles of line. The main route will be between Barnsley and Mexborough, with branch lines to Thurnscoe and Swinton. The opposition to the scheme was very strong, and the promoters, who are the Urban Councils of Wombwell, Wath-on-Dearne, Bolton-on-Dearne, and Thurnscoe, are well satisfied with the result, as out of 22 sections originally proposed 20 have been authorised.

Reduced Lighting in London.—The reduced lighting in London which has given so much inconvenience and indirectly inflicted much loss on many businesses, is to be still further extended. A new order to apply for two months from November 1 has been issued this week. The lights in railway stations and along the water fronts must be masked, and the light in railway trains, tramcars and omnibuses must be reduced and in crossing bridges completely obscured. Powerful motor-car lamps and the aggregation of flares in street markets are prohibited. In streets, squares, and bridges some lights must be extinguished so as to break up conspicuous groups, and the lights must be lowered or made invisible from above. Sky signs, etc., and powerful shop front lights are prohibited, and inside lights of shop fronts must be reduced. Large lighted roof areas must be covered or have the lighting intensity reduced. In tall buildings most of the windows must be shrouded, though moderate lights may be left uncovered at irregular intervals.

Institution of Electrical Engineers.—Sir John Snell's presidential address to the Institution of Electrical Engineers, on Thursday last, covered a wide range of subjects. Referring to the disbandment of the Industrial Committee, he said that in his opinion there must be, apart from the Institution, separate bodies to deal with their own immediate and particular interests. The Institution must adopt a sympathetic attitude toward each and all of them, and be ready to help them or, if asked, to arbitrate between them. He expressed approval of the Institution's new model general conditions for contracts which, in his opinion, established a fair relationship between the purchaser, the contractor and the engineer. As regards the remuneration of younger engineers, he was certain that there was serious cause for complaint from the younger electrical men, and he asked fellow-members as heads of departments to give so far as was reasonable and proper a preference to applicants who belonged to the Institution, and in fixing salaries not to think so much of recording a small fraction of a penny less per unit sold on the cost sheets, but to remember that the cost of living had gone up, and that the best cannot be expected from anybody unless he is adequately paid. He also touched upon the national service, and mentioned that 500 members had offered their services. The response to the proposal that the Institutions of Electrical, Civil and Mechanical Engineers should organise engineers' units for the Royal Naval Division had been so spontaneous that a corps was formed within a few days by men, not only of splendid physique, but also of highly skilled intelligence. Legislation and the question of bulk and domestic supply, future charges to consumers, and capital investments in electrical works and the trend of improvement were also touched upon in the course of a very interesting address.

An Appeal for Fairplay.—In connection with some statements recently made at a meeting of Gloucester Town Council regarding motor omnibuses run there by the Bristol Tramway and Carriage Company, Mr. Samuel White, managing director of the company, has published a letter which he sent to the Town Clerk of Gloucester on October 9. In this he said the company desired to give accommodation to the routes lying between Gloucester and Tewkesbury, and Gloucester and Ledbury, those being the principal places most difficult of access. The public convenience should be placed before any other consideration, and the company thought they were already yielding up much in fixing the fares for the portion of the trip within the city at double the tramway fares, so as to avoid any competition with the tramways. Mr. White submitted that the company ought to be encouraged in every possible way by the Corporation to develop all these outlying districts and sweep the population into Gloucester to do their trading, and likewise to give the Gloucester people the great advantage of being able to reach out to Tewkesbury, Ledbury, etc., by a reliable motor omnibus service from their own doors. The company desire to work in harmony with the Tramways Committee. Mr. White also pointed out that the company had up to the present invested in Gloucester £14,000, of which no less than £5,000 was in fixed property on which rates had to be paid. Surely, therefore, it was undesirable that the Council should take up such an attitude as to refuse licences.

Rail Cleaning.—The Peacock Brake Company have sent to us an interesting leaflet on "Rail Cleaning," referring particularly to the Q-Fel rail cleaner. As an introduction it is stated that in their larger booklet, "Rail Cleaning," the assertion was made that in the near future much closer attention would be given to the systematic cleaning of tramway rails. That this assertion has been fully justified is shown by the figures representing the total wearable length, expressed in car miles, of the blades, which has increased from 867,000 in 1912 to 1,841,000 for the first eight months of 1914. It is pointed out that a tramway having 25 miles of single track or its equivalent can be cleaned regularly once a day and six times a week at a cost for blades alone of £4 8s. 6d. per annum. It is stated that about sixty of the tramways in the British Isles are using Q-Fel cleaners, the undertakings varying in size from Lincoln to Leeds. Many of them have from three to seven sets in regular operation. In the Colonies and in foreign countries the demand is steadily increasing, and during the few weeks preceding the outbreak of war orders were received from Astrakhan, Kischineff, Taschkent, Lille, Lisbon, etc., and repeat orders from Melbourne, Salonica and Santos. The value of the cleaners is indicated by the fact that cabled orders are often received from far distant tramway managers who have made a trial of a single equipment. Among the undertakings which have sent cabled repeat orders are the Anglo-Argentine Tramways Company of Buenos Ayres, for two additional sets of cleaners and 48 spare blades, and the Prahran and Malvern Tramways, of Australia, for one additional set of cleaners and 24 spare blades. Pretoria has ordered an additional one and a half sets and 84 blades, while the last order for Santos, Brazil, was for a fourth set of cleaners and 100 spare blades. The blades on this last order alone represent the cleaning of 30 miles of single track no fewer than 1,000 times. The pamphlet contains a description of the Q-Fel rail cleaner, and it should be in the hands of every tramway manager.

CONTRACTS AND ORDERS.

Walsall Corporation has accepted the tender of A. Reyrolle and Company, Ltd., for extra high and low tension switchgear at £2,460.

Messrs. Estler Brothers have received an order from Manchester Tramways Committee for steel storage shelving for the Hyde Road car depôt.

PERSONAL.

Mr. J. J. Easton has joined the board of directors of Messrs. Siemens Brothers and Company, Ltd.

Mr. A. E. White, who has been city electrical engineer of Hull for many years, and was responsible for the installation of the Hull Corporation tramways, has retired.

Mr. H. Ramsbottom, late of the Continental Tyre Company, has been appointed by the Avon India Rubber Company, Ltd., as another representative for Lancashire to assist Mr. W. Bray.

Burnley Tramway Manager.—At a meeting of Burnley Town Council on October 28, Mr. E. Heap, chairman of the tramways committee, in reply to a question, said that the tramways manager, Mr. Henry Mozley, was a true-born Englishman. He was born near Sheffield and his parents had lived in that neighbourhood for generations. (Laughter.)

Mr. J. A. Panton, who is a well-known expert in connection with electric rolling stock and permanent way equipment, has opened offices at Canadian Buildings, 7 and 9, James Street, Liverpool, and at 2 and 3, Norfolk Street, Strand, London, W.C. Local works in London and Liverpool are now under his personal supervision, in connection with the manufacture of the latest ferro-manganese brake blocks, electric steel castings, and other approved appliances.

We regret to record the death of Mr. Stuart Richardson, city electrical engineer of Wellington, New Zealand, at the age of 51 years. Mr. Richardson went to New Zealand in 1899 as engineer and manager for a private electric lighting company of Wellington, and on completing his engagement he was appointed assistant tramway engineer for the new tramway undertaking which the city was then commencing. Subsequently he became head of the department.

FINANCIAL REPORTS AND MEETINGS.

The City of Buenos Ayres Tramways (1904) have declared the usual quarterly dividend of 1¼ per cent.

Brisbane Electric Tramways Investment Company notify an interim dividend at the rate of 8 per cent. per annum on the ordinary shares for the past half-year.

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The Edison and Swan United Electric Light Company's Report for the year ended June 30 states that there is a net profit of £4,696, which, added to £1,036 brought forward, makes a total profit of £5,732, which the directors propose to carry forward. Taking the business as a whole, the directors state that very considerable expansion has taken place during the past year.

Adelaide Tramway Trust.—A financial statement of the working of the undertaking of the Adelaide (S.A.) Tramway Trust for the half-year ended July 31 last shows that the net revenue was £63,677. The statutory charges amounted to £60,988, so that the surplus remaining was £2,689. This carried to the appropriation account increases that credit to £10,945. The ratio of working expenses to revenue was 61.34 per cent. The capital expenditure on the revenue-earning part of the system, excluding purchase money and stores, was £1,359,013.

COAL MARKET.

November 6, 1914.

Messrs. Locket and Judkins, of 3, Fenchurch Avenue, E.C., supply the following quotations, which are liable to alteration from day to day, and the supply of Welsh coal is subject to the requirements of H.M. Admiralty:—

	Friday, November 6.	Last week.	A Year Ago.	Two Years Ago.
London, free into barge in Thames—	s. d.	s. d.	s. d.	s. d.
Best Admiralty Welsh (large)	28 6	28 6	25 0	22 9
Best Seconds	27 0	26 6	24 3	22 3
Ordinary Drys	26 0	26 6	21 3	20 6
Best Washed Nuts	23 6	23 0	21 0	19 9
Best Washed Peas	22 0	21 6	19 6	18 3
Cardiff, f.o.b.—				
Best Admiralty (large)	22 0	22 0	20 6	17 0
Best Seconds	20 6	20 0	19 9	16 6
Ordinary Drys	19 6	20 0	16 9	14 9
Best Washed Nuts	17 0	16 6	16 6	14 0
Best Washed Peas	15 6	15 0	15 0	12 6
Newcastle, f.o.b.—				
Best Steams	13 3	13 3	15 0	14 0
Best Seconds	11 3	11 3	13 0	13 6
Smalls'	8 6	8 6	7 6	10 6

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 57 of the principal undertakings of the United Kingdom for the week ended October 31 give total receipts of £210,067, or £1,355 less than in the corresponding week last year. The total length of track was 2,630 miles, or 24 more than for the corresponding week. Receipts were at the rate of £79 17s. 5d. per track mile, a decrease of £1 5s. 1d. as compared with the corresponding week of last year.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Anglo-Argentine	Oct. 28	£54,630	£49,043	43	(2,382,996	— £54,035
Auckland (28 days)	Sept. 25	19,945	20,995	12	65,350	+ 3,797
Ballarat and Bendigo	Aug. 16	3,166	3,055	20	17,282	— 248
Brazilian St. Rly. Mlrs.	May	44,690	50,227	43	523,872	+ 76,626
Brazilian Traction	August	418,287	347,645	35	8,196,383	— 14,168
Brisbane	August	29,970	33,178	35	231,897	+ 24,649
British Columbia $	August	770,628	674,812	9	1,864,835	— 161,736
Buenos Aires Pt. & City	June	6,791	5,733	26	43,250	+ 3,143
Buenos Aires Lacrose	July	45,221	43,327	4	43,327	— 1,894
Calcutta Rs.	Oct. 31	57,802	56,175	43	28,98,782	+ 68,814
Cape Town	June	11,560	12,742	52	155,456	+ 18,249
Carthagena & Herrerias	October	1,582	1,548	43	22,688	— 3,555
Cordoba	Sept.	13,343	12,384	26	82,058	+ 1,333
East India	October	1,978	2,007	13	6,099	+ 188
Kalgoorlie	August	3,257	3,042	34	21,116	— 2,268
La Plata	Sept.	4,528	4,190	39	41,852	— 3,659
Lima	August	33,939	29,800	35	271,607	+ 5,102
Lisbon Mlrs.	July	164,715	171,179	31	1,143,064	+ 45,838
Madras (14 days) Rs.	Oct. 15	26,161	24,042	41	5,41,291	+ 30,947
Manila	June	133,500	132,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	357,500	+ 7,000
Mexico $	Sept.	604,744	667,421	39	5,513,765	+ 397,434
Montevideo	Sept.	27,870	25,227	47	334,965	— 9,336
Para	August	34,485	19,354	30	189,946	— 38,540
Port Elizabeth	June	3,268	3,212	52	44,931	+ 1,901
Puebla $	Sept.	51,100	52 200	39	534,500	+ 18,800
Rangoon	October	5,968	4,600	43	50,657	— 942
Shanghai $	July 29	31,168	24,600	30	720,340	+ 94,215
Singapore $	Sept. 26	11,771	9,036	38	447,966	+ 16,214
Toronto $	August	850,222	850,639	35	6,742,786	+ 425,112
Winnipeg $	August	340,507	322,762	35	2,760,944	+ 111,242

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	Latest Return. 1914.	Incr. or Dec.	Aggregate. Wks.	Aggregate. 1913-4.	Increase or Dec.
Aberdeen Corporation	Oct. 28	£1,434	£1,473	+ £39	22	£37,435	+ £492
Accrington Corp.	,, 28	580	450	— 130	30	16,958	— 621
Ayr Corporation	,, 31	254	226	— 28	24	10,884	— 886
Bath Electric	,, 28	998	809	— 99	43	42,353	— 4
Birkenhead Corp.	Nov. 1	1,431	1,161	— 270	30½	39,221	— 1,230
Birmingham Corp.	Oct. 31	12,472	11,894	— 578	31	374,346	+ 12,680
Blackburn Corporation	,, 28	1,319	1,029	— 290	31	41,774	+ 135
Blackpool Corporation	,, 29	700	618	— 82	31	61,700	— 9,909
Bolton Corporation	Nov. 1	2,789	2,465	— 324	31	85,912	+ 252
Bournemouth Corp.	,, 4	1,794	1,639	— 155	31	66,478	— 3,914
Bradford Corporation	Oct. 31	6,067	6,017	— 50	31	194,888	+ 8,501
Brighton Corporation	Nov. 1	943	919	— 24	30½	36,818	— 252
Bristol	Oct. 30	7,602	8,139	+ 537	43½	374,008	+ 21,150
British Elec. Federatn.	Sept. 18	53,780	49,637	*	...	...	...
Burnley Corporation	Oct. 31	1,739	1,225	— 514	31	48,994	— 4,710
Burton-on-Trent Corp.	Nov. 1	279	278	— 1	31	9,403	+ 264
Bury Corporation	,, 1	1,351	1,176	— 175	31	43,678	+ 989
Cardiff Corporation	Oct. 24	2,578	2,513	— 65	29	84,437	+ 1,264
Chatham and District	,, 29	895	1,007	+ 112	43	41,596	+ 1,117
Chesterfield Corp.	,, 29	255	241	— 14	30	8,353	+ 383
Colne Corporation	,, 31	272	196	— 76	...	...	...
Cork Electric	,, 29	499	465	— 34	43	21,811	— 42
Croydon Corporation	,, 23	1,608	1,550	— 58	29	52,140	+ 2,143
Darlington Corporation	,, 31	249	250	+ 1	31	8,301	+ 514
Derby Corporation	,, 31	921	934	+ 13	30½	31,760	+ 838
Dover Corporation	,, 31	224	247	+ 23	31	8,195	— 101
Dublin & Lucan	,, 30	117	119	+ 2	17½	2,784	— 36
Dublin United	,, 30	4,727	5,408	+ 681	43	255,323	+ 14,515
Dundee City	,, 28	1,261	1,221	— 40	23½	31,206	— 429
East Ham Corporation	,, 31	943	1,196	+ 253	30½	35,149	+ 4,617
Exeter Corporation	,, 30	332	315	— 17	31	11,324	+ 304
Gearless Motor 'Buses	Sept. 19	606	502	— 103	38	18,019	+ 6,575
Glasgow Corporation	Oct. 31	21,097	20,006	— 1,091	21	441,748	+ 3,785
Glossop (U. Elec. Supply)	,, 31	128	100	— 28	44	5,410	— 227
Halifax Corporation	,, 27	2,026	2,008	— 18	30	68,798	+ 2,870
Hastings & District	,, 28	899	837	— 62	43	45,017	— 2,836
Huddersfield Corp.	,, 31	2,099	2,287	+ 188	31	93,269	+ 7,136
Hull Corporation	,, 31	3,182	2,934	— 248	31	96,771	— 514
Ilford U.D.C.	,, 31	432	562	+ 130	30	17,489	+ 3,441
Ilkeston Corporation	Nov. 4	127	118	— 9	31	4,142	— 167
Ipswich Corporation	Oct. 31	415	406	— 9	31	14,841	— 199
Isle of Thanet	,, 31	390	361	— 29	4	1,865	— 222
Kilmarnock Corp.	,, 31	170	152	— 18	34	4,047	— 343
Lanarkshire	,, 29	1,924	1,828	— 96	43	81,461	+ 7,515
Lancashire United	,, 28	1,566	1,473	— 93	43	71,071	+ 3,942
Leeds City	,, 31	8,209	7,838	— 371	31	287,588	+ 814
Leicester Corporation	,, 31	2,777	2,689	— 88	44	125,179	+ 2,508
Leith Corporation	,, 31	686	669	+ 8	24	17,979	+ 207
Leyton U.D.C.	,, 29	1,229	1,321	+ 92	29	41,570	+ 1,785
Liverpool Corporation	,, 31	13,026	12,408	— 618	43½	578,647	+ 10,294
Llandudno & Colwyn B.	,, 30	178	160	— 18	48	15,003	— 3,046
London County Council	,, 28	41,639	45,883	+ 4,244	30	1,330,907	+ 59,711
London Gnl. Omnibus.	Aug. 1	68,575	71,625	+ 3,050	31	1,982,031	+ 64,392
London United	Sept. 13	6,705	5,572	— 1,133	38	236,806	— 2 559
Lowestoft Corporation	Oct. 31	203	187	— 16	4	898	— 105
Maidstone Corporation	,, 29	187	179	— 8	31	6,818	+ 230
Manchester Corp.	,, 31	17,752	16,417	— 1,335	31	538,305	— 6,006
Met. Elec. Trys.	Sept. 18	9,468	8,176	— 1,292	36	345,062	+ 4,025
Nat. Steam Car Co., Ld.	Oct. 31	4,932	5,496	+ 564	52	224,505	+ 77,070
Nelson Corporation	,, 31	201	162	— 39	30½	6,029	— 633
N'castle-on-Tyne Corp.	,, 31	4,999	5,683	+ 684	31	167,881	+ 16,971
Newport (Mon.) Corp.	,, 31	796	755	— 41	31	25,884	+ 1,980
New St. Helens & Dist.	,, 28	749	889	+ 140	17	17,100	+ 1,606
Northampton Corp.	,, 30	551	603	+ 52	30½	18,379	+ 116
Nottingham Corp.	,, 29	3,296	3,191	— 105	30½	105,085	+ 1,587
Oldham Corporation	Nov. 1	2,299	1,908	— 391	33	71,449	+ 234
Portsmouth Corp.	Oct. 31	1,982	1,987	+ 5	31	77,878	...
Preston Corporation	,, 28	861	837	— 24	31	28,690	+ 950
Provincial	,, 31	1,706	1,884	+ 178	4½	9,055	+ 1,073
Reading Corporation	,, 29	688	654	— 29	30	22,062	+ 582
Rhondda	,, 29	1,207	1,188	— 69	43	58 519	+ 1,357
Rochdale Corporation	,, 31	1,609	1,403	— 206	31	51,408	+ 687
Rotherham Corp.	Nov. 4	1,226	1,084	— 142	31	32,677	+ 1,201
Salford Corporation	,, 2	5,240	4,727	— 513	30	157,252	— 5,758
Sheffield Corporation	,, 1	7,758	7,615	— 143	31½	244,628	+ 6,874
Southampton Corp.	Oct. 28	1,214	1,146	— 68	30	41,744	+ 36
Southend-on-Sea Corp.	,, 28	725	724	— 1	31	34,925	+ 2,405
South Met. Trys.	Sept. 18	1,228	1,071	— 157	38	42,045	+ 8,049
South Shields Corp.	Oct. 31	661	695	+ 34	30½	24,166	+ 1,567
Sunderland Corp.	Nov. 1	1,406	1,345	— 61	31	46,733	+ 908
Sunderland District	Oct. 28	590	567	— 23	52	30,582	+ 1,223
Swindon Corporation	,, 28	156	178	+ 22	30	5,538	+ 378
Torquay	,, 29	447	414	— 33	43	24,979	+ 3,560
Trys. (M.E.T.) 'Buses	Sept. 19	8,928	5,256	— 3,672	38	336,230	+ 183,768
TynesideTrys. & Tmrds	Oct. 28	492	630	+ 138	18	11,454	+ 1,791
Wallasey Corporation	,, 31	1,125	1,041	— 84	30½	40,595	+ 1,874
Walsall Corporation	,, 31	643	626	— 17	44	27,473	+ 132
Walthamstow U.D.C.	,, 31	690	707	+ 17	31	25,876	+ 2,453
Warrington Corp.	,, 23	442	415	— 27	30	11,842	— 334
West Ham Corporation	,, 29	2,648	2,733	+ 85	30	86,687	+ 8,324
Wigan Corporation	,, 29	1,467	1,456	— 1	30	44,799	— 737
Wolverhampton Corp	Nov. 4	1,061	1,020	— 41	32	33,389	— 949
Yorkshire (W. Riding)	,, 1	1,458	1,378	— 80	44	63,956	+ 127

* From such of the services as were working both last year and this year the receipts show a decrease of £4,089 upon the week.

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THE

Tramway & Railway World

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Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

HENDON URBAN DISTRICT COUNCIL.

TO FIRE ENGINE MAKERS AND OTHERS.

The above Council are prepared to receive tenders for the manufacture, supply, and delivery of a Petrol Motor Combination Fire Engine, including Pumps, and Two-wheeled (50 feet) Fire Escape, First-Aid Engine, Kemics, Hose, and Accessories, to the Central Fire Station, Hendon, N.W.

Specification may be seen and forms of tender and other particulars obtained on application to Mr. S. Slater Grimley, M.Inst.C.E., Engineer and Surveyor to the Council.

A deposit of £5 will be required for the form of tender, which will be returned on receipt of a *bona-fide* tender (accompanied by drawings and full particulars of the fire engine and appliances tendered for) if not accepted, and in the case of the accepted tender such deposit will be returned on the execution of the contract and bond required by the Council.

Failing such execution at the time aforesaid such deposit will be forfeited.

Sealed tenders, endorsed "Tender for Motor Fire Engine, etc.," addressed to the Chairman of the Council, to be sent in not later than 5 p.m. on Monday, the 23rd day of November, 1914.

The Council do not bind themselves to accept the lowest or any tender.

Dated this 9th day of November, 1914.

HENRY HUMPHRIS,
Clerk to the Council.

Council Offices, Hendon, N.W.

CITY OF MANCHESTER.

The Electricity Committee of the Manchester Corporation are prepared to receive tenders for the supply, delivery, and erection, at their Barton Power Station, of the following plant:—

Specification No. B. 1.—Ten 50,000 lbs. Water Tube Boilers, complete with Superheaters, Stokers, Economizers, etc.

Specification No. B. 3.—Two 15,000 kw. Turbo-Alternators, complete with Condensing Plant, Pipework, etc.

Specifications, drawings, and forms of tender may be obtained on application to Mr. F. E. Hughes, Secretary, Electricity Department, Town Hall, Manchester, on payment of a fee of three guineas for each specification, which amount will be refunded on receipt of a *bona-fide* tender.

Extra copies of each of the above specifications can be obtained by *bona-fide* tenderers at a charge of one guinea per copy, which will not be refunded.

Further particulars and information can be obtained on application to Mr. S. L. Pearce, Chief Electrical Engineer, Dickinson Street, Manchester.

Tenders, duly endorsed and addressed to the Chairman of the Electricity Committee, must be delivered at the Town Hall not later than 10 a.m. on Wednesday, December 16, 1914.

The Corporation do not bind themselves to accept the lowest or any tender.

THOMAS HUDSON,
Town Clerk.

Town Hall, Manchester,
November 10, 1914.

COUNTY OF LONDON.

The London County Council invites tenders for the (*a*) High- and Low-Tension Switchgear, and (*b*) a Gravity Bucket Ash Conveyor in connection with the London County Council Tramways.

The specifications, bills of quantities, forms of tender, etc., may be obtained from the Clerk of the Council, at the County Hall, Spring Gardens, S.W., after payment to the Cashier of the Council of £2 in respect of each section of the work. This amount will be returnable only if the tenderer shall have sent in a *bona-fide* tender, and shall not have withdrawn the same. The contract documents may be inspected before the payment of the fee.

The person whose tender is accepted will be bound by the contract to pay wages at rates not less, and to observe hours of labour not greater, than the rates and hours set out in the Council's list. Particulars of the Council's Standing Orders as to its conditions of tender and contract are given in every issue of the *London County Council Gazette*. No tender received after 11 a.m. on Tuesday, December 8, 1914, will be considered.

The Council does not bind itself to accept any tender.

LAURENCE GOMME,
Clerk of the London County Council.

County Hall, Spring Gardens, S.W.

BOROUGH OF STOCKTON-ON-TEES.

SUPPLY OF PAPER INSULATED, LEAD COVERED AND ARMOURED CABLES.

The Corporation invite tenders for 800 yards of .3 by .15 by .3 E.H.T. three-core Feeder Cable of the above description suitable for a three-phase system with centre point earthed, also for 800 yards of L.T. three-core Pilot and Telephone Cable. The cables to be delivered on suitable drums at the Corporation Electricity Works in a period of four weeks from the date of placing the order.

Copies of specification, general conditions, and form of tender may be obtained from Mr. J. J. Smith, Borough Electrical Engineer, on payment of a fee of one guinea, which will be returned on receipt of a *bona-fide* tender.

Tenders, sealed and endorsed "Supply of Cables," to be delivered to the undersigned not later than 12 o'clock noon on November 20, 1914.

The lowest or any tender not necessarily accepted.

ARTHUR B. CROSBY,
Town Clerk.

Borough Hall, Stockton-on-Tees,
November 10, 1914.

COUNTY BOROUGH OF WALSALL.

The Walsall Corporation invite tenders for the supply, delivery, and erection of

Extra High Tension, Medium and Low Tension Switchgear for Sub-stations.

Copies of the specification, formal conditions, etc., may be obtained upon application to the Consulting Engineer, Mr. E. M. Lacey, M.Inst.C.E., 12, Victoria Street, Westminster, London, S.W., on payment of three guineas, which will be returned on receipt of a *bona-fide* tender.

Extra copies of the specification may be obtained on payment of half a guinea, which will be returned.

Tenders, sealed and endorsed on the outside "Tender for Electricity Works Contract No. 8," to be addressed to the Town Clerk, Walsall, and delivered not later than 10 a.m. on Tuesday, December 1, 1914.

The Corporation do not bind themselves to accept the lowest or any tender, and they will not accept the tender of any firm or person paying less than the standard rate of wages to their workmen.

By order, HERBERT LEE,
Town Clerk.

Council House, Walsall,
November 9, 1914.

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MANCHESTER CORPORATION TRAMWAYS.

The Tramways Committee of the Manchester Corporation are prepared to receive tenders for the supply and delivery of Tramcar Trucks. Specifications and forms of tender may be obtained on application to Mr. J. M. McElroy, General Manager, Corporation Tramways, 55, Piccadilly, Manchester. Tenders are to be addressed to the Chairman of the Tramways Committee, 55, Piccadilly, Manchester, endorsed "Tender for Trucks," and must be received not later than 10 a.m. on Tuesday, December 1, 1914.

The Committee do not bind themselves to accept the lowest or any tender.

THOMAS HUDSON,
Town Clerk.

Town Hall, Manchester,
November 13, 1914.

POSITIONS VACANT.

URBAN DISTRICT OF ERITH.

ELECTRICITY AND TRAMWAYS UNDERTAKINGS.

ELECTRICAL ENGINEER.

Applications are invited for the above appointment from electrical engineers and also from electrical engineers who possess a knowledge and experience in the working and management of a tramways undertaking, but preference will not necessarily be given to applicants possessing tramway experience.

A salary of from £250 to £400 per annum will be paid, according to the experience and qualifications of the successful applicant.

The person appointed will be required to devote the whole of his time to the duties of the appointment, and to reside in the district of the Council.

Applications (on forms which can be obtained from the undersigned), accompanied by copies of not more than three recent testimonials, endorsed "Electrical Engineer," to be sent to me, the undersigned, not later than 12 noon on Friday, the 27th inst.

Canvassing, either directly or indirectly, is strictly prohibited.

JNO. ATKINSON,
Clerk and Solicitor.

Council Offices, Erith,
November 10, 1914.

FOREMAN.

Foreman required for tramways overhead equipment, permanency for suitable man. Wages commencing £2 per week. Apply, stating experience, age, references, etc., to the CHIEF ENGINEER, Corporation Electricity Works, St. Helens, Lancs.

FOR SALE.

Jarrah Blocks (second-hand, not turned), in good condition. For Sale. Pearson, Combermere Road, Brixton, S.W.

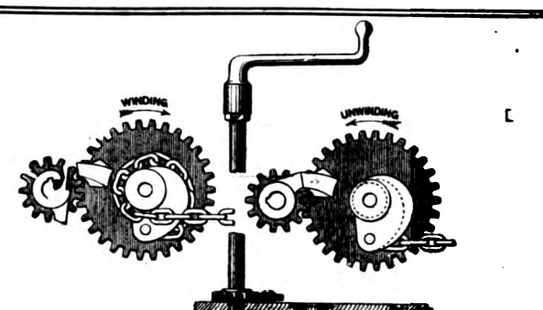
TRAMWAY SUPPLIES, Ltd.,
Tramway Engineers,
Sole Selling Agents for S. Dixon & Sons' Tramway Material,
160, WOODHOUSE LANE, LEEDS.
Sole Manufacturers of
TURNER'S PATENT AUTOMATIC POINT CONTROLLERS.
Telegrams: "Controllers, Leeds." Telephone: 3488 Leeds.
OVERHEAD LINE MATERIAL AND SUPPLIES.

SEND YOUR ENQUIRIES FOR
Insulating Materials,
Brass, Iron, and Copper Stampings, and General Supplies
TO
JOSEPH THOMPSON,
COLUMBIA WORKS, 106, Eyre Street, SHEFFIELD.
Telegrams: "Insulator. Sheffield."
Engineers' Specifications worked to.

Pole Paints E&RC
As supplied to important Companies at home & abroad. Durable, ready-mixed, permanent colours that defy rust and exposure. Samples & Prices on request.
Robert KEARSLEY & Co., Ltd.
RIPON, England

MILLARS' TIMBER AND TRADING CO., LTD.
PINNERS' HALL, GREAT WINCHESTER STREET, LONDON, E.C.,
beg to inform their Customers that the War has not interfered with their production of
JARRAH for Wood Paving,
and they are in a position to give prompt deliveries from stocks in this country.

SPECIAL
Car Varnish
for finishes of great durability and brilliant lasting lustre.
Sole Manufacturers:
PINCHIN, JOHNSON & Co, LTD.,
Minerva House, Bevis Marks,
LONDON,
E.C



The "Peacock" IMPROVED Brake
(PATENT).
Note the simplicity of the Radial Contact pieces which render this the quickest of all geared hand brakes by
(1) Preventing the drum from over-running on release;
(2) Stopping the drum always at the point from which recovery of chain is most rapid;
(3) Eliminating all idle turning of the handle.
THE "PEACOCK" BRAKE CO., 27, CLEMENTS LANE, LONDON, E.C.

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THE
Tramway AND Railway World

Established in 1892 and Published by

THE TRAMWAY & RAILWAY WORLD PUBLISHING CO., Ltd., AMBERLEY HOUSE, NORFOLK STREET, LONDON, W.C.

Sixty-four issues are published annually, including twelve large numbers which are fully illustrated and printed on art paper.

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SATURDAY, NOVEMBER 14, 1914.

THE "OCEAN"
ACCIDENT AND GUARANTEE CORPORATION, LTD.,
IS THE
PREMIER INSURER OF TRAMWAYS
HEAD OFFICE:
MOORGATE STREET, LONDON, E.C.

THE MUNICIPAL TRAMWAYS ASSOCIATION.

Like many other bodies which hold annual conferences in the autumn, the Municipal Tramways Association considered it expedient, on account of the war, to abandon their conference of this year. This involved the postponement of the annual business meeting of the Association which usually precedes the adjournment of the conference. It was necessary, however, that the business meeting should be held, and it took place yesterday at Salford. The chief matter of interest was the annual report of the Executive Council, and it loses none of its value as a record of useful work from the fact that it is made public some six or seven weeks later than would have been the case in the ordinary way. The Council have held various meetings and have been in communication with a number of other bodies and Government Departments, and their record for the year shows much service rendered to the tramway industry. An important subject on which a report has recently been published by a joint committee of the Association and of the Tramways and Light Railways Association is that of certain defects which are apt to arise in the insulation of tramcar controller leads, and which by short-circuiting both armatures may render the magnetic brake inoperative. The Board of Trade called the attention of the Association to the matter in connection with an accident which occurred about a year ago, and the sub-committee appointed by the Council have given much attention to the question of the best means of preventing the trouble. It is satisfactory also to note that the Council, along with representatives of tramway undertakings in the metropolitan area, have supported the recommendations of the House of Commons Select Committee on motor traffic, and particularly the one which urges that all duties relating to street traffic in London and neighbourhood should be transferred to a special Traffic Department. Much attention has been given to the question of the contribution by owners of motor omnibuses and trackless trolley vehicles to the cost of road maintenance. Generally, the Council opposed any veto by road authorities against Bills, and held that no contributions to road maintenance should exceed three-eighths of a penny per car mile, and that equal obligations should be imposed on all owners of passenger-carrying vehicles. The Council are naturally of opinion that the matter of road maintenance is in an unsatisfactory state, and they welcome the appointment of a Parliamentary Committee to inquire fully into the subject. Good work has also been done in connection with revising the design of British standard tramway rails, with the best sections of tires and axles, and with the methods of specifying the resistance of conductor rails. In all these matters the Council have been acting with the British Engineering Standards Committee. The Council's Corrugation Committee are still pursing their researches; but so far no definite conclusions have been reached. Special reference is made by the Council in their report to the great value of the services rendered to the Association by the hon. secretary, Mr. C. J. Spencer, and to the great advantage in having as secretary the chief officer of a large municipal tramway system. While it is, of course, to be regretted both from the technical and social sides that circumstances rendered it impracticable to hold a conference this year, this is only one of many departures from the regular routine of activity that the state of war has entailed, and members have the satisfaction of knowing that in due course the annual conferences will be resumed. In the meantime the interests of municipal tramways will be carefully watched by an experienced Council which has already rendered the Association much useful service.

PROPOSED TRAMWAY EXTENSION AT HALIFAX.

Halifax Town Council have now decided to promote a Bill in the next session of Parliament, asking for authority to construct important tramway extensions. The extensions include a new line from the present terminus in Brighouse to link up with the Huddersfield system, a continuation of the West Vale line to Stainland, a new line from Salterhebble, on the West Vale route, *via* Wood Bottom, to Elland Town Hall, and a continuation of the Halifax to Triangle line to Ripponden. The Shelf line, it is also proposed, shall be doubled, so as to provide through running between the Halifax and Bradford tramway systems. Motor omnibus services are also provided for linking up with the Hebden Bridge line, between Mytholmroyd and Crag Vale, and trolley vehicles within the borough from Spring Hall Lane to Wainstalls, and from Skircoat Road, *via* Hunger Hill, to Siddal.

Alderman C. F. Spencer, chairman of the Tramways Committee, said that the Stainland and Ripponden tramways might not pay for a few years, but he believed that they would eventually do so. Meanwhile, he was certain that both Halifax and the two districts connected would benefit in trade through the facilities provided. The Elland line would pay from the outset. As to the proposals affecting Brighouse, Halifax, he regretted they had been placed in an unfortunate situation, through committees of the Brighouse and Huddersfield Corporations having, according to report, entered into provisional agreements under which the Huddersfield tramways were to be brought, *via* Fixby and Rastrick, to the present Halifax terminus at Brighouse. The outcome of that would be that when the agreement between Halifax and Brighouse presently ran out, the interests of Halifax there would be taken over under the Act and handed over to Huddersfield. He was hopeful, however, that Brighouse would come to realise, before being finally committed to Huddersfield, that their true interests were associated with Halifax, and not with Huddersfield. Alderman F. Whitley Thomson warned the Council that, if Halifax did not progress it could not remain stationary. Unless they linked up their tramways with the surrounding districts, there would be a lessening of the trade of the town. After further discussion the promotion of the Bill was agreed to with only one dissentient.

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MUNICIPAL TRAMWAYS ASSOCIATION.

The annual meeting of the Municipal Tramways Association (Incorporated) was held yesterday in the Town Hall, Salford. It will be remembered that the annual conference of the Association, which was to have taken place in September, was abandoned on account of the war, and the annual business meeting, which usually takes place at the close of the Conference, was postponed till yesterday.

The report of the Executive Council for the year 1913-14, which was submitted and approved, showed that the number of members was as follows:—Honorary members, 1; local authorities, 75; managers and assistants, 111; total, 187.

The report deals with a number of matters that have received the attention of the Council since the Conference of 1913. Defects in tramcar controllers is the subject of a joint report of a sub-committee and of representatives of the Tramways and Light Railways Association that will shortly be submitted to the Executive Council. Attention was directed by the Board of Trade in December last to this matter in view of a case in which the insulation of a controller had become chafed so that contact took place with an adjacent terminal, setting up a short circuit across both armatures and rendering the magnetic brake inoperative.

In regard to motor omnibus competition in London, a conference of representatives of tramway undertakings in the Metropolitan area with the Executive Council was held in London on January 16, when a resolution was passed expressing concurrence with the opinion of the House of Commons Committee on motor traffic that all duties relating to road and street traffic within the Metropolitan police area should be vested in a special traffic department to be constituted as recommended by the Select Committee. It was also resolved that legislative effect should be given to the remaining recommendations in the report of the Select Committee.

On the question of road maintenance by the owners of omnibuses and trackless trolley vehicles, various discussions have taken place, and at a conference called by the Executive Council in Manchester on April 9 last, when a number of large towns promoting Bills were represented, it was resolved that any claim by road authorities, that their consent should be necessary before motor omnibuses or trackless trolley vehicles should be run, should be strongly resisted; that in no circumstances should a contribution towards road maintenance of more than $\frac{3}{8}$d. per car mile be agreed to; that the claims of railway companies for contribution towards extra cost of strengthening bridges should be strongly opposed; and that equal obligations should be imposed on all owners of passenger-carrying vehicles. The Council regretted to report, however, that provisions had been inserted in the whole of the Bills during the past session for contributions towards road maintenance.

The Council had given the question of slow moving traffic their consideration, but up to the present no special legislation had been formed restricting the position of slow-moving vehicles on the roadway.

The design of the British standard tramway rails had occupied several meetings of a Special Committee, which had decided to recommend that sections 1 and 5 of the standard series should be dropped, and that numbers 2, 3, and 4 should be retained, subject to a reduction in the width of the flanges from 7in. to 6½in., and to the head of the rail, while retaining its present coining of 1 in 21, having in addition 12in. radius. The Standards Committee had adopted a recommendation that two additional sections should be added in place of the two deleted, namely, a light rail specially adapted for interurban work, and a 112lb. rail in place of No. 5, identical except as to weight, of No. 4, but with the web in a more central position.

Several meetings had been held on the subject of rail corrugation, but no definite conclusions had been arrived at.

In addition to routine business, the meeting adopted a resolution by Mr. Henry Mozley, Burnley, providing that the whole of the members of the Council and office bearers should be elected *en bloc* for a further twelve months.

L.C.C. TRAMWAY MATTERS.

PROPOSED LINKING-UP AND CONSOLIDATION OF THE TRAMWAY SYSTEM.

At the meeting of the London County Council on Tuesday last the Highways Committee presented a long report embodying their proposals for the consolidation of the tramway system. The Committee have for some time been considering a scheme for the linking-up of existing dead-ends termini and for other improvements in the present arrangements. As a result of their investigation of the problem the Committee recommended that application should be made in the Parliamentary Session of 1915 for authority to carry out the linking-up of certain termini. There are at present 22 inner terminal points and 9 outer terminal points. Only 11 of these dead-ends were included in the scheme. The adoption of the improvements recommended in these instances would do away with the present termini or place them in more convenient positions, and would go far to remove a serious cause of congestion and danger to the public. In addition to the plan referred to, the Committee proposed that steps should be taken for the reconstruction and electrification of tramways in Grange Road, Southwark Park Road, Raymouth Road and Rotherhithe New Road. These lines, if electrified, would constitute an alternative route from London termini to Greenwich and Woolwich. The Council possessed authority under existing powers to reconstruct its horse tramways, but some modification would be necessary in the arrangement of the existing lines, and the Committee thought it advisable to include the scheme in the Tramways and Improvements Bill of 1915. In the meantime they were considering whether it would be practicable to reconstruct these tramways under existing powers. The total capital expenditure involved by the schemes recommended was £881,885, of which £787,035 was required for the construction of tramways and £94,850 for street widenings. The Committee remarked that there might conceivably be criticisms in certain quarters at their action in bringing forward proposals of this magnitude in the present condition of tramway finance, but the financial side of the question had been prominently before them in determining the proposals to be put forward. Their recommendations, whilst framed with the view of reducing congestion and eliminating dead-ends, would, they believed, result in a large addition to the revenue of the tramways owing to improved efficiency of working which would thus be secured. The plans embodied a comprehensive policy which aimed at what under existing conditions the Committee regarded as a complete consolidation of the existing tramway system of London. The local authorities concerned had been consulted in regard to the proposals and conferences have been held with their representatives. The Highways Committee regretted that some authorities had refused to confer with them. The Committee hoped, however, that in the circumstances under which the proposals are put forward, coupled with the strong views on the matter expressed by the Select Committee on Motor Traffic, which reported in 1913, that their suggestions would receive sympathetic consideration and that the necessary consents might be obtained; but the Committee regarded it of such importance to the Council to obtain the powers recommended that they advised that in the event of the consents under standing orders not being obtained, Parliament should be asked to suspend those orders in so far as might be necessary to secure consideration of the plans by a Committee of Parliament. In view of the conditions which have arisen as a result of the war, it was proposed that the Bill should specify seven years as the period for the completion of the construction of the tramways.

TRAMWAY TRAFFIC RECEIPTS.

Under the procedure recently adopted by the Council, the Highways Committee are required to present a periodical report at the first meeting of the Council in February and April and the third meeting in July and October, including the traffic receipts of the tramways with a comparison for the corresponding period of the previous year. In view of the special interest attached to the traffic receipts, especially at the present time, many members of the Council desired to have a return submitted, as before, from week to week, and the Highways Committee recommended that they should be authorised to submit weekly traffic returns to the Council during the continuance of the war.

TRAMWAY SHELTER AT WOOLWICH.

The Highways Committee proposed that a weather shelter should be erected at Beresford Square, Woolwich, as a large number of passengers wait here for cars going to Eltham, Abbey Wood and London. The Borough Council proposed to invite tenders for an iron and glass shelter at an estimated cost of £200, and the Committee recommended that the Council should contribute £80 for the purpose.

TRAMWAY MATERIALS: INVITATION OF TENDERS.

The Highways Committee recommended that tenders be invited from selected firms for the supply of (i.) jim crows for bending tramway rails; (ii.) galvanised iron pipes; (iii.) creosoted deal paving blocks; and (iv.) pulp for tramway tickets.

RATES OF WAGES.

A complaint had been received from the National Amalgamated Union of Labour that the Rodney Foundry Company, Limited, whose tender had been accepted for certain tramway fittings for 1914-1915, was not paying some of its employees the rates of wages specified in the Council's list. The Highways Committee reported that they had made exhaustive inquiries, and after careful consideration arrived at the conclusion that the company was not paying wages to moulders in accordance with the agreement between the London and District Association of Engineering Employers and the London and Erith branches of the Friendly Society of Iron-founders, and they recommended that the company be placed on the list of persons or firms from whom the Council will not in future accept tenders.

A long debate took place on the report of the Highways Committee as to the legislative proposals for next session.

Mr. G. H. Hume said the scheme had been submitted as a whole, with a view of perfecting the London tramway system as far as possible. The total expenditure on capital account was £881,885, but this would be spread over some years. He left the matter entirely to the Council, the Committee having done what they ought in submitting their recommendations.

Major Gray moved an amendment, deleting from the scheme all those proposed extensions which had not received the consent of the Borough Councils or road authorities. This was not the time to fight out the veto question or to waste public money on controversial legislation.

Mr. Reynolds seconded.

Sir John Benn characterised the amendment as a disgraceful surrender of tramway interests. The proposals were the result of expert advice, and now they were apparently to be thrown over by a sort of family arrangement.

Mr. Cyril Jackson said they could not expect at such a time as this Parliament would sanction such a large expenditure, much of which was for the purchase of property for improvements. They might well get ready to proceed with unopposed schemes.

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Mr. Hume explained that the proposals were the outcome of a complete survey of London.

The amendment was carried, on a division, by 56 to 41, and the schemes were then considered seriatim.

After debate and a number of divisions, seven proposals were eliminated from the scheme, leaving the following for which powers are to be sought:—

	Length M. F. C.	System.	Cost £
Seven Sisters Road to near Crouch Hill Station ..	1 5 -	Conduit	46,095
Charles Street to Charterhouse Street	- 1 5	Conduit	9,605
Mare Street to Terrace Road and Church Crescent	- 5 7	Overhead	
	- 1 2	Conduit	26,930
High Street, Shoreditch to Cambridge Road	2 - 4	Conduit	53,380
†Aldgate to near Mark Lane Station	1 4 -	Conduit	41,189

Reconstruction of Tramways in Southwark Park Road, Grange Road, Raym uth Road and Rotherhithe New Road—3 miles on Conduit system (cost £74,709)

† This line was included in the Council's Tramways and Improvements Bill 1914. The scheme was passed by the House of Commons, but was struck out of the Bill by a Committee of the House of Lords.

All other tramway reports were adopted.

MISCELLANEOUS NEWS AND NOTES.

Sheffield Tramways Committee intend to proceed with the re-construction of the Bow Street track at an estimated cost of £1,300.

Electro-Harmonic Society.—The next concert (ladies' night) will be held at the Holborn Restaurant (King's Hall) on Monday next, November 16th, at 8 p.m.

Tramcar Lighting.—The British Thomson-Houston Company have issued a pamphlet, describing a convenient combined switch and fuse for tramcar lighting circuits. In the 600-volt design the base and cover are of glazed porcelain, and for higher voltages a special moulded insulated material, and a cartridge fuse mounted in clips, which is easily replaceable, are employed.

London Motor 'Bus Routes Stopped.—About 500 motor omnibuses on 50 routes in London have been requisitioned by the military authorities, most of them for service on the Continent. The destination boards on these vehicles have been changed, and are now marked to Potsdam, to Berlin, or to Vienna, as the case may be. It is reported that the gaps caused in the number of vehicles is being filled at the rate of nearly 40 a week.

Obstructing a Tramway Improvement at Cardiff.—Sir John Courtis, chairman of the Tramways Committee, replying to a question at a meeting of the Cardiff Council on November 9, said that the committee had not abandoned their intention to double the tramline in Newport Road, but they had had considerable difficulty in acquiring the strip of land required for the undertaking. The owners imposed prohibitive terms, and the only thing left for the Council was to apply for compulsory powers. The ground landlord, Lord Tredegar, was willing to meet them, but the leaseholders blocked the way.

London Electricity Supply.—At a meeting of the London County Council on Tuesday a report was considered recommending the promotion of legislation to deal with the electricity supply of Greater London. This is a scheme which, as already reported, proposes the establishment of a new electricity undertaking for the whole Metropolitan area and for bringing the existing electrical undertakings into the scheme. The new undertaking would be under the supervision of a public body representing the various local authorities concerned, and it would be worked by a company. Sir John Benn moved an amendment in favour of the establishment of a municipal undertaking, but this amendment was defeated by a majority, and the original proposal was agreed to.

Aluminium Conductors.—The British Aluminium Company have issued a new edition of their pamphlet on electric power transmission by aluminium conductors. It consists largely of a study of the economical and technical aspects of the use of aluminium as a transmission line conductor. In making comparisons with copper every possible factor influencing the cost has been considered, while certain additional matter has been included, together with useful tables and diagrams. The relative properties of aluminium and copper are well explained and leading facts set out in comparative tables. Among other advantages it is shown that aluminium conductors for high tension transmission lines are cheaper than those made of copper. The pamphlet, which is well illustrated, is worthy of close study, both from the technical and the practical points of view.

A Petrol Tramcar at Stirling.—Presiding at the annual meeting of the Stirling and Bridge of Allan Tramways Company on Monday last Mr. H. F. Brand, the chairman, said that the company had been experimenting for about a year with a petrol-driven tramcar, the first of its kind in Scotland. The car had proved an unqualified success, and it had been the intention of the company to proceed with a Provisional Order to authorise the general substitution of mechanical traction for the present horse haulage, when Stirling Town Council entered into negotiations with them regarding a proposal that the Corporation should take over the tramway system and electrify it. These negotiations had been postponed by reason of the outbreak of the war, but he had no doubt that when hostilities had ceased the parties would get together again. Meanwhile the company had obtained the extension of the licence permitting them to experiment with the petrol tramcar for another year, and in the coming year they would consider in good time regarding what was to be done. As showing the success which had attended the running of the petrol tramcar it was mentioned that the passengers carried on the St. Ninians section, where the new car was in constant use, had increased by no fewer than 24,300.

CONTRACTS AND ORDERS.

A. Reyrolle and Company, Limited, have an order for switchgear from Walsall Town Council.

Ipswich Corporation has accepted the tender of Chamberlain and Hookham for the supply of meters for the ensuing year.

The General Electric Company, Limited, have again secured the G.P.O. six months' contract for the supply of Osram lamps.

The Peacock Brake Company have an order from Southend Corporation for brakes and sanding gear for three electrically-driven coal wagons.

Titan Trackwork Company, Limited, have recently received orders for special junctions in manganese steel for Leeds Corporation tramways, a car shed lay-out for Preston tramways, and for special trackwork for the Glasgow and the Sheffield Corporation tramways.

The Anger Manufacturing and Supply Company have recently received large orders for axles and nave plates or flanges from the War Office. They also have orders from several large motor car and other companies, who are building complete wagons for pontoon and limber requirements.

Cammell, Laird and Company, Limited, have an order from Sheffield Corporation Tramways for 50 special tramcar tires at 31s. each, and the Dart Motor and Transport Company for a 15 h.p. Armstrong-Whitworth motor chassis for the tramways department at £375, with an additional 5 per cent. for contingencies.

Glasgow Works Sub-Committee of the Tramways Committee have accepted the following tenders:—Traction street poles, Stewarts and Lloyds, Limited; trolley feeder cable, St. Helens Cable Company; steel plates for manholes, W. Baird and Son; special track work, Titan Trackwork Company, Limited, Edgar Allen and Company, Limited, and Hadfields, Limited; cast steel pipe connections for Pinkston, Stewarts and Lloyds, Limited.

The Mirrlees Watson Company, Limited, have recently received orders for condensing plant from the following:—

Gravesend Corporation, Devonport Corporation, Manchester Corporation, Leeds Corporation, Dartford U.D.C., County Borough of Hampstead, Wombwell Main Colliery Co., Ltd., Hulton Colliery Co., Ltd., Rockingham Colliery, Moira Colliery, Bestwood Coal and Iron Co., Ltd. (per Fraser and Chalmers), John Glen and Sons, Caldercruix (per Greenwood and Batley), Marley Hill Colliery (per C. A. Parsons and Co.), Kirkby Colliery, Ormonde Colliery, Stanton Iron Works Co., Sanquhar and Kirkconnel Collieries, Ltd., Clifton Colliery, North Bitchburn Coal Co., Ltd., Millom and Askam (per Fraser and Chalmers), India Rubber and Gutta Percha Co., Ltd., Hubert Davies and Co., Ltd. (for Messina Mines), Nobel's Explosives Co., China Light and Power Co.

PERSONAL.

Mr. H. Wilmer has succeeded Mr. Harry Jones as chief engineer of the Great Eastern Railway.

Mr. A. Wilson has been appointed temporary charge engineer at the Dover Corporation electricity works.

Mr. J. W. Burr, deputy electrical engineer of Croydon, has been appointed borough electrical engineer of Swansea, at a salary of £500 per annum.

Sheffield Tramways Committee.—Sir William Clegg has been re-elected chairman and Mr. A. T. Bescoby vice-chairman, of Sheffield Tramways Committee.

Dr. H. F. Parshall will read a paper on "The Economics of Electric Railway Distribution" at the Institution of Civil Engineers, on Tuesday, November 17.

Glasgow Tramways Committee.—There has been no change in the convener or sub-convener of the Tramways Committee. Ex-Bailie Kirkland remains the convener, and Ex-Bailie Alston the sub-convener.

Mr. F. A. Yerbury, who has recently returned from Vancouver, and was formerly with the Mirrlees Watson Company, has become director and manager of the sales department of the Premier Cooling and Engineering Company, Limited, Broadway Court, Westminster, S.W.

St. Helens Cable and Rubber Company, Limited.—Some changes have recently been made in the directorate of St. Helens Cable and Rubber Company, Limited, of Warrington, and the following now constitute the board:—Mr. T. O. Callender (chairman), Mr. D. Sinclair and Mr. J. J. Easton.

Mr. C. Higham, after an absence of twelve months, has been re-elected a member of the Blackburn Town Council. On Mr. Higham's retirement, Mr. Alderman A. Nuttall, J.P., was appointed vice-chairman of the Electricity and Tramways Committee in his stead. The latter has now relinquished the post, in order to allow Mr. Higham to take over his former position. Alderman W. Thompson, chairman of the Electricity and Tramways Committee, has been appointed Mayor of Blackburn.

Mr. J. Gottschalk.—The Northampton Tramways Committee have reported to the Town Council that they had received the following letter from Mr. J. Gottschalk, who, under circumstances that are well known, recently resigned the management of the tramways:—

"In closing my management of the Northampton Corporation Tramways, I desire to express to you my most sincere thanks for the kindness and appreciation I have received from you at all times. Although on many occasions my opinion has not coincided with the opinions of some members of the Committee, I have always tried to act fearlessly but considerately, and in this I hope I have succeeded. I am proud to think that the Tramways under my management have been extremely successful, thanks in a large measure to the great help I have received from an efficient and loyal staff. I deeply deplore the circumstances which necessitate my leaving the work I have always loved, and I can only conclude with the earnest hope that the Undertaking will continue to prosper."

The committee reported that they had accepted the resignation with regret, and in accordance with the resolution of the Council the borough accountant will be instructed to pay to Mr. Gottschalk the sum of £300 out of the reserve fund of the undertaking.

Mr. Charles Challenger has been for 40 years in the service of the Bristol Tramways and Carriage Company, and holds the premier

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position in Great Britain as long service tramway manager, covering a period of over 35 years. On the outbreak of the war Mr. Challenger was appointed to take charge of the Bristol Red Cross transport, and this has resulted in the successful dealing with over 1,000 sick and wounded soldiers arriving in Bristol. For upwards of three years Mr. Challenger, as commandant of the tramways detachment of the Bristol branch of the British Red Cross Society, has conducted a weekly class for training in first aid and transport work. The class has been greatly encouraged by Sir George White, Bart.

The late Mr. Frederic Smith, a director of Frederic Smith and Company, Limited, wire manufacturers, of Halifax, whose death occurred early in September, left estate of the value of £128,279 gross.

COAL MARKET.

November 13, 1914.

Messrs. Locket and Judkins, of 3, Fenchurch Avenue, E.C., supply the following quotations, which are liable to alteration from day to day, and the supply of Welsh coal is subject to the requirements of H.M. Admiralty:—

	Friday, November 13.	Last week.	A Year Ago.	Two Years Ago.
London, free into barge in Thames—	s. d.	s. d.	s. d.	s. d.
Best Admiralty Welsh (large)	28 6	28 6	25 3	22 9
Best Seconds	27 0	27 0	24 6	22 3
Ordinary Drys	26 0	26 0	21 9	20 6
Best Washed Nuts	23 6	23 6	21 0	20 3
Best Washed Peas	22 0	22 0	19 6	18 9
Cardiff, f.o.b.—				
Best Admiralty (large)	22 0	22 0	20 9	17 0
Best Seconds	20 6	20 6	20 0	16 6
Ordinary Drys	19 6	19 6	17 3	14 9
Best Washed Nuts	17 0	17 0	16 6	14 6
Best Washed Peas	15 6	15 6	15 0	13 0
Newcastle, f.o.b.—				
Best Steams	13 3	13 3	15 0	14 0
Best Seconds	11 3	11 3	13 0	13 6
Smalls	8 6	8 6	7 3	10 6

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 57 of the principal undertakings of the United Kingdom for the week ended November 7 give total receipts of £215,378, or £5,339 more than in the corresponding week last year. The total length of track was 2,630 miles, or 24 more than for the corresponding week. The receipts this year were at the rate of £81 17s. 10d. per mile of track, and last year at the rate of £80 11s. 11d., thus giving an increase for the past week of £1 5s. 11d. per mile open.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Anglo Argentine	Nov. 4	£59,167	£52,400	44	£2,375,396	— £60 902
Auckland..... (28 days)	Sept. 25	19,945	20,995	12	65,350	+ 3,797
Ballarat and Bendigo	Aug. 16	3,166	3,055	20	17,282	— 248
Brazilian St. Rly. Mlrs	May	44,820	50,237	43	523,872	+ 76,626
Brazilian Trctn. Mlrs.	Sept.	6,028,078	6,096,940	39	35,170,088	+ 1,346,273
Brisbane	October	27,250	28,763	43	288,621	+ 28,603
British Columbia .....$	Sept.	734,283	650,516	13	2,015,351	— 245 503
Buenos Aires Pt. & City	June	6,791	6,723	26	43,250	+ 3,143
Buenos Aires Lacroze..	July	45,221	48,327	4	43,327	-- 1,894
Calcutta.....Rs.	Nov. 7	65,104	63,686	44	29,62,418	+ 67,396
Cape Town	June	11,560	12,742	52	155,466	+ 13,249
Carthagena & Herrerias	October	1,582	1,543	43	22,688	— 3,555
Cordoba	Sept.	13,348	12,384	26	82,058	+ 1,333
East India	October	1,978	2,007	13	6,099	+ 188
Kalgoorlie	August	3,357	3,042	34	21,116	— 2,263
La Plata	Sept.	4,528	4,190	39	41,852	— 3,659
Lima	August	33,939	29,800	35	271,607	+ 5,102
Lisbon ..... Mlrs.	July	164,715	171,179	31	1,143,064	+ 45,838
Madras (14 days) Rs.	Oct. 15	26,161	24,042	41	5,41,291	+ 30,947
Manila	June	133,500	132,500	26	833,569	+ 14,513
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	387,500	+ 7,000
Mexico .....$	Sept.	604,744	667,421	39	5,513,765	+ 397,434
Montevideo	Sept.	27,870	25,227	47	331,945	— 9 336
Para	August	24,485	19,354	39	189,946	— 38,540
Port Elizabeth	June	3,268	3,312	52	44,931	+ 1,901
Puebla ..... $	Sept.	51,100	62 200	39	534,500	+ 18,800
Rangoon	October	5 963	4.600	43	50,657	— 942
Shanghai .....$	July 29	31,163	24,600	30	720,340	+ 94,215
Singapore .....$	Oct. 3	12.241	9,797	39	457,763	— 18,658
Toronto .....$	Sept.	865,796	879,321	39	7,622,107	+ 438,637
Winnipeg .....$	Sept.	381,732	810,996	39	3 071.940	+ 90.506

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913-	1914.	Incr. or Dec.	Aggregate. Wks	1913-4.	Increase or Dec.
Aberdeen Corporation..	Nov. 4	£1,513	£1,601	+ £88	23	£39,036	+ £580
Accrington Corp.....	Oct. 28	580	450	— 130	30	16,958	— 621
Ayr Corporation	Nov. 7	238	224	— 14	25	10,608	— 908
Bath Electric	,, 4	799	891	+ 92	44	43,244	+ 88
Birkenhead Corp.	,, 8	1,229	1,216	— 13	31½	40,437	— 1,242
Birmingham Corp.	,, 7	12,313	12,408	+ 95	32	386,755	+ 12,775
Blackburn Corporation	,, 4	1,249	1,089	— 160	32	42,864	— 25
Blackpool Corporation	,, 9	784	766	— 18	33	62,467	— 2,948
Bolton Corporation	,, 8	2,585	2,507	— 78	32	88,420	+ 174
Bournemouth Corp.....	,, 11	1,720	1,663	— 57	32	68,142	— 3,970
Bradford Corporation..	,, 7	5.581	5,828	+ 247	32	200,716	+ 8,748
Brighton Corporation..	,, 8	877	936	+ 59	31½	37,754	+ 192
Bristol	,, 6	7,720	8,263	+ 543	44½	382,271	+ 21,695
British Elec. Federatn.	*	...	...	...	...	...	...
Burnley Corporation ..	Nov. 7	1,593	1,394	— 199	32	50,388	— 4,909
Burton-on-Trent Corp.	,, 8	267	283	+ 16	32	9,686	+ 280
Bury Corporation.....	,, 8	1,297	1,199	— 98	31½	44,677	+ 891
Cardiff Corporation.....	Oct. 24	2,578	2,513	— 65	29	84.437	+ 1,964
Chatham and District..	Nov. 5	921	1,036	+ 115	44	42.623	+ 1,233
Chesterfield Corp.	,, 5	260	247	— 13	31	8,601	+ 369
Colne Corporation	,, 7	286	208	— 78	..	...	...
Cork Electric.....	,, 5	488	459	— 29	44	22.270	— 71
Croydon Corporation ..	Oct. 30	1,588	1,536	— 47	30	53,677	+ 2,096
Darlington Corporation	Nov. 7	243	241	— 2	32	8 542	+ 513
Derby Corporation	,, 7	939	948	+ 4	31½	32.703	+ 842
Dover Corporation	,, 7	211	239	+ 28	32	8,435	— 78
Dublin & Lucan	,, 6	117	114	— 3	18½	2,848	— 39
Dublin United	,, 6	4,901	5,592	+ 991	44	261,114	+ 15,787
Dundee City	,, 4	1,323	1,240	— 83	24½	32.447	— 504
East Ham Corporation	,, 7	975	1,202	+ 227	31½	36,351	+ 4,843
Exeter Corporation	,, 6	319	323	+ 4	32	11,647	+ 208
Gearless Motor 'Buses.	*	...	...	...	...	...	...
Glasgow Corporation ..	Nov. 7	20,691	20,495	— 196	22	465.243	+ 3,312
Glossop(U.Elec.Supply)	,, 7	115	100	— 15	45	5.510	— 841
Halifax Corporation ..	,, 3	2,193	1,994	— 199	31	70.767	+ 2,672
Hastings & District.....	,, 4	865	904	— 61	44	45.821	— 2,897
Huddersfield Corp.	,, 7	2,022	2,395	+ 373	32	95,664	+ 7,509
Hull Corporation	,, 7	3,121	3,014	— 107	32	99,786	— 622
Ilford U.D.C.	,, 7	444	600	+ 156	31	18,089	+ 3,597
Ilkeston Corporation ..	,, 11	126	121	— 5	32	4,263	— 172
Ipswich Corporation ..	,, 7	398	407	+ 9	32	15.249	— 184
Isle of Thanet	,, 7	362	357	— 5	5	2.222	— 304
Kilmarnock Corp.	,, 7	160	152	— 8	23	4,199	— 350
Lanarkshire	,, 5	1,851	1,709	— 142	44	83,170	+ 7,373
Lancashire United	,, 4	1,610	1,511	— 99	44	72 598	+ 3,845
Leeds City	,, 7	8,009	8,064	+ 55	32	265,652	+ 545
Leicester Corporation..	,, 7	2,766	2,811	+ 45	45	127,991	+ 2,551
Leith Corporation	,, 7	678	715	+ 37	25	18.694	+ 244
Leyton U.D.C.	,, 5	1,299	1,399	+ 100	30	42 960	+ 1,885
Liverpool Corporation..	,, 7	12,969	12,987	— 32	44½	586,584	+ 10,262
Llandudno & Colwyn B.	,, 6	162	163	+ 1	49	15,166	— 2,045
London County Council	,, 4	48,202	46,486	+ 3,284	31	1,377,392	+ 62,994
London Gnl. Omnibus..	*	...	...	...	...	...	...
London United	*	...	...	...	...	...	...
Lowestoft Corporation	Nov. 7	197	198	+ 1	5	1,026	— 108
Maidstone Corporation	Oct. 29	187	179	— 8	31	6,818	+ 220
Manchester Corp.....	Nov. 7	17.120	16,988	— 182	32	555,243	— 6,623
Met. Elec. Trys.	*	..	...	...	...	...	...
Nat. Steam Car Co., Ld.	Nov. 7	3,570	4,055	+ 485	1	4,055	+ 485
Nelson Corporation.....	,, 7	179	141	— 38	31½	6,169	— 670
N'castle-on-Tyne Corp.	,, 10	5,012	5,770	+ 758	32	173,651	+ 17,730
Newport (Mon.) Corp....	,, 7	794	752	— 32	32	26,636	+ 1,887
New St. Helens & Dist...	,, 4	773	830	+ 57	18	17,930	+ 1,657
Northampton Corp	,, 6	545	608	+ 63	31	18,987	+ 179
Nottingham Corp.	,, 5	3,326	3,297	— 29	31½	108,383	+ 2,538
Oldham Corporation ...	,, 8	2,174	1,954	— 220	33	73,408	+ 24
Portsmouth Corp.....	,, 7	2,039	2,223	+ 184	32	80 102	...
Preston Corporation ..	,, 4	882	859	— 23	32	29,586	+ 910
Provincial	,, 7	1,693	2,020	+ 322	5½	11,085	+ 1,366
Reading Corporation ..	,, 5	754	675	— 79	31	22,738	+ 508
Rhondda.....	Oct. 29	1,207	1,138	— 69	48	53,519	+ 1,357
Rochdale Corporation	Nov. 7	1,549	1,459	— 90	32	52,869	+ 598
Rotherham Corp.....	,, 11	980	950	— 30	32	33,627	+ 1,170
Salford Corporation ..	,, 9	5,025	4,755	— 270	31	161,898	— 5,994
Sheffield Corporation..	,, 8	7,431	7,821	+ 390	32½	252.449	+ 7,212
Southampton Corp.....	,, 4	1,291	1,246	— 45	31	42,990	— 9
Southend-on-Sea Corp.	,, 4	756	712	— 44	33	35,637	+ 2,361
South Met. Trys.	*	...	...	...	...	...	...
South Shields Corp.....	Nov. 7	677	748	+ 71	31½	24,914	+ 1,633
Sunderland Corp.....	,, 9	1,294	1,342	+ 48	32	48,075	+ 955
Sunderland District ...	,, 4	559	517	— 42	1	517	+ 43
Swindon Corporation ...	,, 4	162	184	+ 22	31	5,722	+ 399
Torquay.....	Oct. 29	447	414	— 33	43	24,979	+ 3,560
Trys. (M.E.T.) 'Buses	*	...	...	...	...	...	...
TynesideTrys.&Tmrds.	Nov. 4	487	549	+ 62	19	12,003	+ 1,854
Wallasey Corporation	,, 7	1,094	1,103	+ 9	31½	41,698	+ 1,382
Walsall Corporation ...	,, 7	630	673	+ 43	45	28,147	+ 174
Walthamstow U.D.C....	,, 7	713	744	+ 31	32	26,681	+ 2,500
Warrington Corp.....	Oct. 29	442	415	— 27	30	11,842	— 334
West Ham Corporation	Nov. 5	2,758	2 803	+ 45	31	89,490	+ 3,369
Wigan Corporation	,, 5	1,487	1,377	— 110	31	46,183	— 847
Wolverhampton Corp	,, 11	1,061	1,012	— 49	33	34.402	— 997
Yorkshire (W. Riding)	,, 8	1,556	1,496	— 60	45	65,452	+ 66

* Issue of Traffic Returns suspended during the War.

DICK, KERR & CO.,
Limited,
ABCHURCH YARD, CANNON STREET,
LONDON, E.C.
ENGINEERS & CONTRACTORS.

Complete Equipment
TRAMWAYS & LIGHT RAILWAYS
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THE

Tramway & Railway World

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Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

MADRAS AND SOUTHERN MAHRATTA RAILWAY CO. (LTD.).

The Directors are prepared to receive tenders for :—

(1) Steel Rails (about 4,018 tons),
(2) Steel Fish-Plates (about 137 tons),
(3) Steel Sleepers and Keys (about 2,850 tons)

in accordance with the specifications, which may be seen at the offices of the Company. The charge for each specification will be one guinea, which will not be returned.

Tenders must be sent in, addressed to the Secretary, not later than 2 p.m., on Tuesday, December 1, 1914, marked "Tender for Steel Rails," or as the case may be.

The Directors do not bind themselves to accept the lowest or any tender.

Company's Offices :
91, York Street, Westminster, S.W.,
November 18, 1914.

COUNTY BOROUGH OF ROTHERHAM.

The Rotherham Corporation invite tenders for the supply and delivery of Tramway Uniforms required for 60 motormen, 60 conductors, 4 inspectors, and 1 point-boy.

General conditions and form of tender can be obtained on application to the undersigned.

The person or firm whose tender is accepted will be required to enter into a contract, which will contain the usual Fair Contracts Clause, and will also be required to observe the conditions of the Trade Board's Act, 1909, and the order made by the Board of Trade thereunder.

Tenders, endorsed "Tramway Uniforms," must be sent to me not later than December 10 next.

The Corporation do not bind themselves to accept the lowest or any tender.

CHAS L. DES FORGES,
Town Clerk.

Town Hall, Rotherham,
November 14, 1914.

COUNTY BOROUGH OF ROTHERHAM.

The Tramways Committee are prepared to receive tenders for printing and supplying the Tram Tickets required for the period of 1, 2 or 3 years as from January 1 next.

The estimated number of tickets required is about 8,000,000 per annum, but this figure is given for information only and must not be considered binding.

The person or firm whose tender is accepted will be allowed the privilege of arranging for advertisements to be printed on the back of such tickets.

Sample tickets and other information can be obtained on application to the Tramways Manager.

Tenders, endorsed "Tram Tickets," to be sent to me not later than December 10 next.

CHAS L. DES FORGES,
Town Clerk.

Town Hall, Rotherham,
November 14, 1914.

CITY OF MELBOURNE, AUSTRALIA.

SUPPLY OF INSULATED COPPER CABLES.

Tenders are invited for the supply of :—

1,200	yards	0.3	sq. in.	Single Conductor	Lead-Covered	Cable.
2,400	,,	0.25	,,	,,	,,	,,
1,600	,,	0.15	,,	,,	,,	,,
660	,,	7/16 S.W.G.	,,	,,	,,	,,
880	,,	7/16	,,	Concentric	,,	,,

Specification, tender form, etc., can be obtained on application to the undersigned.

Such application must be accompanied by a deposit of 5s., which will be returned on receipt of a *bona-fide* tender.

Tenders to be sent to the undersigned endorsed "Tenders for Insulated Copper Cables," and must be received by them not later than 12 noon on Wednesday, December 9, 1914.

The Council reserves to itself the right, but does not bind itself to accept the whole or any portion of any tender.

McILWRAITH, McEACHARN AND CO., PPTY., LTD.,
Agents for Melbourne City Council.

Billiter Square Buildings, London, E.C.

COUNTY BOROUGH OF WALSALL.

The Walsall Corporation invite tenders for the supply, delivery, and erection of :—

Six 250 kw. Rotary Converter Equipments.
One 509 kw. Rotary Converter Equipment.

Copies of the specification, formal conditions, etc., may be obtained upon application to the Consulting Engineer, Mr. E. M. Lacey, M.I.C.E., 12, Victoria Street, Westminster, London, S.W., on payment of three guineas, which will be returned on receipt of a *bona-fide* tender.

Extra copies of the specification may be obtained on payment of half-a-guinea, which will not be returned.

Tenders, sealed and endorsed on the outside "Tender for Electricity Works, Contract No. 9," to be addressed to the Town Clerk, Walsall, and delivered not later than 10 a.m. on Tuesday, December 8, 1914.

The Corporation do not bind themselves to accept the lowest or any tender, and they will not accept the tender of any firm or person paying less than the standard rate of wages to their workmen.

By order, HERBERT LEE,
Town Clerk.

Council House, Walsall,
November 18, 1914.

CITY OF WINCHESTER.

The Electricity Committee of the Winchester Corporation are prepared to receive tenders for the supply, delivery and erection of

One 500 Kilowatt, Direct Current, Turbo-Generator, complete with Condensing Plant, Pipework, etc.

Specifications, drawings and forms of tender may be obtained on or after November 26 next, on application to Mr. R. Ayton, A.M.I.E.E., City Electrical Engineer, Electricity Works, Winchester, on payment of a fee of three guineas for each specification, which amount will be returned on receipt of a *bona-fide* tender.

Tenderers will be asked to submit, in addition, an offer for three Belliss-Parker steam dynamos now installed in the power station, which it is proposed the turbo-generator will replace.

Tenders, sealed and endorsed on the outside "Tender for Generator, Electricity Works," to be delivered at the Guildhall not later than 12 mid-day, Thursday, December 17, 1914.

The Corporation do not bind themselves to accept the lowest or any tender received.

THOMAS HOLT,
Town Clerk.

The Guildhall, Winchester,
November 17, 1914.

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BURGH OF LEITH.

TRAMWAYS EMPLOYEES' UNIFORMS.

The Town Council invite tenders for the supply of summer uniforms, factory or tailor-made, as may be determined, conformed to sample cloth and suits to be seen at the Tramways Offices, 165, Leith Walk, and to relative conditions of contract. Particulars may be obtained from the Tramways Manager there.

Tenders (endorsed "Tramways Uniforms"), with separate sample of cloth marked with a private mark, which shall not be recognisable until the tenders are opened, must be lodged with me not later than December 8 next.

The lowest or any tender may not necessarily be accepted.

Town Clerk's Office, Leith,
November 20, 1914.

D. ROBERTSON,
Town Clerk.

POSITIONS VACANT.

EAST INDIAN RAILWAY.

ASSISTANT ELECTRICAL ENGINEER.

The Directors of the East Indian Railway Company are prepared to receive applications, by letter only, from duly qualified candidates for the appointment of Assistant Electrical Engineer.

Candidates, who must not be less than 25 years of age, must have received a thorough practical and theoretical training, and must have actual working experience in the operation and management of low and high-tension polyphase, as well as continuous current power and lighting plant. They should also have some knowledge of office and accounts work.

SALARY: Rupees 450, rising to Rupees 600 per calendar month.

TERMS: A four years' agreement in the first instance, with first-class free passage to India.

The selected candidate will be required to pass a medical examination by the Company's consulting physician before appointment.

Letters of application, accompanied by a brief record in chronological order of the candidate's career, with dates, together with copies (not originals) of testimonials, and a medical certificate of fitness for residence in India, should be addressed to the undersigned not later than December 7, 1914.

By order, C. W. YOUNG,
Secretary

East Indian Railway Company,
28-30, Nicholas Lane, London, E.C.,
November 18, 1914.

JUNIOR ASSISTANT ELECTRICAL ENGINEERS.

The Newcastle-upon-Tyne Electric Supply Company, Limited, require Young Men over the age of 18 years, who have had some electrical training, for positions of Junior Assistant Electrical Engineers for Power Station and Sub-Station Work.

A two years' agreement will be entered into, and the remuneration will be 15s. per week for the first year and 20s. per week for the second year. On the completion of the agreement excellent opportunities occur for rapid advancement in various branches of the Company's business.

Applications, stating age, to be addressed to THE ENGINEER, Carville Power Station, Wallsend-on-Tyne.

TRAMWAY SUPPLIES, Ltd.,
Tramway Engineers,
Sole Selling Agents for S. Dixon & Sons' Tramway Material,
160, WOODHOUSE LANE, LEEDS.
Sole Manufacturers of
TURNER'S PATENT AUTOMATIC POINT CONTROLLERS.
Telegrams: "Controllers, Leeds." Telephone: 3488 Leeds.
OVERHEAD LINE MATERIAL AND SUPPLIES.

SEND YOUR ENQUIRIES FOR
Insulating Materials,
Brass, Iron, and Copper Stampings, and General Supplies
TO
JOSEPH THOMPSON,
COLUMBIA WORKS, 106, Eyre Street, SHEFFIELD.
Telegrams: "Insulator, Sheffield."
Engineers' Specifications worked to.

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POLE PAINTS
As supplied to important Companies at home and abroad. Durable, ready-mixed, permanent colours that defy rust and exposure. Samples and prices on request.
Robert KEARSLEY & Co., Ltd.
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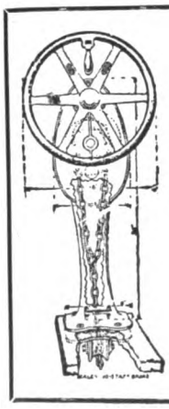
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THE
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SATURDAY, NOVEMBER 21, 1914.

THE PRACTICAL TRAINING OF TRAMWAY OFFICERS.

The Institution of Civil Engineers have been studying the problem of the practical training of engineers for 46 years. Their last report on the subject was adopted by the council in July. This document records the very diverse opinions of 234 engineers and engineering firms, among whom 78 are classified together as municipal engineers and engineers of water works and gas works. The result has been the preparation of a synopsis covering the more important features of the various branches of engineering and of engineering as applied to water works and gas works. With what object this classification has been made is not very clear, except as giving the qualifications required for admission to the Institution itself. As a guide to the parents or the guardians of a youth showing proclivities in the direction of some branch of engineering, it must be said that the report is only bewildering, resembling in this respect all previous discussions and conferences that have been held on practical training. Out of the eight schedules one is headed "municipal" and another "electrical." Tramways are included among the 31 municipal and the 24 electrical subjects. Now, if the two tramway associations were to take up the subject of the practical training of their officers, what a wide field for discussion would be opened out! It is true that the probabilities are that the field would be found illimitable, but the discussion would be a useful safety valve for those whose opinions on the subject are so strong that some outlet is almost imperative for them; it might also afford a welcome change from that other interminable and highly technical topic—rail corrugations. On both these topics everyone feels competent to speak with authority and to have a settled opinion. Discussion might at least be useful in pointing out the essential qualifications of tramway officers. Where they are under a board, with a managing director as a mouthpiece, the conditions do not differ greatly from other joint-stock enterprises. If in a tight place they can always refer awkward questions to the board, and so shift the burden of decision and explanation on to the broader shoulders of the general management. Officers under municipalities have no such easy escape from trouble, and their only means of coping with busybodies is by a constant exercise of tact. It would be almost correct to say that with a sufficient amount of this precious gift all other qualifications sink into insignificance. In the case of large tramway undertakings, especially those in which the general manager really and effectively manages, he takes the place of the higher officials in a company and relieves the officers under him of much worry. In smaller concerns the tramway manager, who is often the engineer and surveyor as well, has an unenviable task, his only consolation being that he is qualifying for a more important position, whether in his own town—as the system grows—or in other and more developed cities. The manager of comparatively small municipal tramways has in many instances to be not only a first-rate administrator, but a civil engineer, a road master, and electrical or mechanical expert, and now, in many places, a coach builder; he must be a good accountant, a good organiser, and have complete mastery over himself and over those under him. The nearest approach to such an one is the engineer to a big contractor on an important work; he has to be a jack of all trades, and good at them all, and he, too, has to possess a phenomenal amount of tact, enabling him to study the interests of his employer and of the common good while coping with the vagaries of those who are finally responsible for the undertaking—vagaries which, in the case of contractors' work, sometimes take the form of callow assistant engineers, or, in the case of public authorities, that of over-zealous councillors whose policy is subject to change every three years or so. The difficulties of a tramway manager or engineer constantly tend to increase as public demands for greater facilities grow, and if the Associations could prescribe a course of practical training that would turn out the kind of man required for the successful working of tramways, their labours would certainly not be in vain.

INCREASING TRAMWAY TRAFFIC IN LONDON.

A comparative statement of the amount of the traffic receipts and the number of passengers carried during the five weeks ended November 4, and the corresponding weeks in 1913, which has been submitted to the London County Council, shows that there was a substantial increase in receipts during October. This is attributable mainly to the reduction in motor omnibus competition, a large number of the omnibuses having been requisitioned by the War Office. The route length now being worked is 142.08 miles, including 141.21 miles of electric lines and 1.77 miles of horse lines. The following are the traffic returns:—

Week ended		Passengers carried 1914.	Increase or Dec. over 1913.	Traffic Receipts 1914.	Increase or Dec. over 1913.
ELECTRIC TRACTION.					
Oct. 7	..	10,383,969	+ 255,674	£44,793	+ £1,669
Oct. 14	..	10,373,396	+ 317,354	44,260	+ 1,818
Oct. 21	..	10,754,491	+ 549,711	46,103	+ 3,018
Oct. 28	..	10,723,341	+ 910,165	45,735	+ 4,385
Nov. 4	..	10,889,115	+ 718,881	46,342	+ 3,443
Total	..	53,124,312	+ 2,760,785	£226,833	+ £14,363
HORSE TRACTION.					
Oct. 7	..	47,442	— 83,137	£146	— £275
Oct. 14	..	45,834	— 82,487	141	— 275
Oct. 21	..	46,273	— 57,006	143	— 180
Oct. 28	..	47,927	— 46,142	148	— 141
Nov. 4	..	46,677	— 51,785	144	— 159
Total	..	234,153	— 320,557	£722	— £1,030
Total for whole system	..	53,358,465	+ 2,440,228	£227,555	+ £13,333

The receipts for the eight months from April 1 to November 4 are as follows:—£1,369,848 from lines worked by electric traction, and £7,545 from lines worked by horse traction, or a total of £1,377,393, an increase of £62,994, as compared with the same period of last year.

The Cheltenham and District Light Railway Company have recently made a new arrangement with the Corporation for the supply of electrical energy. In future the company will pay 1.25d. per unit for the first 400,000 units per annum, 1.20d. for the next 100,000 units, 1d. per unit for the next 100,000 units, and ¾d. per unit for any additional amount above the 600,000 units per annum,

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L.C.C. TRAMWAY MATTERS.

At the meeting of the London County Council on Tuesday a number of reports were submitted by the Highways Committee, including one on arrangements for a temporary supply of power which has become necessary owing to the necessity of increasing the tramway service.

TEMPORARY SUPPLY OF POWER FOR INCREASED SERVICE.

The Highways Committee reported that they considered it desirable that arrangements should be made at once for increasing the existing car services; but before additional cars could be run it would be necessary to obtain a temporary supply of power from an outside source. The London Electric Supply Corporation had agreed to provide an additional supply of power up to about 1,500 kw. at a price of £3 a kw. a year and .4d. a unit. This compares with the price paid for a supply of power previously obtained from the company at £3 a kw. a year and .35d. a unit. The increase of .05d. a unit is due to the increased cost of coal owing to war insurance risks. The power will be provided at the Lewisham substation, and will be sufficient to enable between 50 and 60 additional cars to be run. The cost involved by this arrangement was estimated at £6,750 for a period of five months.

SUPPLY OF PLOUGHS FOR CARS.

Experience has shown that for each car on conduit or partially conduit routes three ploughs per car are necessary to provide for repairs and distribution as reserves at the change and important traffic points. There are at present in use 1,725 cars, and the actual number working on the overhead trolley system within the county is about 120, while another 120 cars are constantly in the shops for renovation or repair. This leaves 1,485 cars for which ploughs are required to be constantly available, and on the basis of three ploughs a car 4,455 ploughs are needed. At present there is a deficiency of 305 ploughs, and the Highways Committee recommended that a capital estimate of £1,250 should be approved for the purchase of this number of ploughs.

STORAGE OF COAL AT GREENWICH.

Facilities available for the storage of reserve supplies of coal for the Greenwich generating station are not considered adequate, and the Highways Committee recommended that the reserve should be increased by another 10,000 tons. Wm. Cory and Son, Limited, the present contractors for the supply of coal for the Greenwich generating station, are prepared to supply 10,000 additional tons of coal at the price included in their contract, with an addition of 1s. a ton to cover war risks. The company would unload the coal from steamers at its Purfleet Wharf, stack the same, store for a period not exceeding 12 months, reload the coal into barges and deliver to the Greenwich generating station as required by the Council upon payment of an additional sum of 4s. a ton, making a total additional charge of 5s. a ton above the contract price. It was also proposed that the Council should have the option during the next twelve months of extending the arrangement for a further period of six years, and if such an extension were made the payment to be made to the company would be at such lower rate than the 4s. a ton as should be agreed. The total expenditure involved is estimated at £9,500. Of this amount £7,500 represents the cost of the coal. Of the 4s. a ton to be paid for storage, etc., 2s. a ton (£1,000) will be paid on the arrival of the coal at Purfleet, and a further 2s. a ton on delivery at the generating station.

EMPLOYEES WORKING MORE THAN SIX DAYS A WEEK.

The Highways Committee reported that it had not been found practicable to dispense with the employment on their leave days of a portion of the staff of the tramways department during September and October, the numbers being employed for more than six days a week ranging from 184 to 273 per week during the period indicated. The employment of the men affected was due to the mobilisation of the army and navy reservists, to the enlistment of other employees and to work having to be done on emergency. Nearly all of the men thus employed were motormen and conductors.

RATES OF PAY OF EMPLOYEES IN TRAINING.

The regulations of the Council provide that motormen and conductors in the tramway department shall receive half pay while in training, motormen for a period not exceeding three weeks and conductors for a period not exceeding one week. In consequence of a large number of motormen and conductors having joined His Majesty's forces, it has been considered expedient to invite conductors to undertake the duties of motormen and car shed and other employees to qualify as conductors. In order that the men who thus volunteer to change their occupations may not suffer any loss while engaged in training, the Highways Committee suggest that such men should be paid at their ordinary rates of pay while they are being so trained.

All tramway reports were adopted.

Mr. G. H. Hume, in reply to questions, said that the fees paid to M. Mariage, the manager of the Paris General Tramways and Omnibus Company, who recently gave the Council expert advice in regard to the schemes for tramway improvements by linking up lines and abolishing dead-ends, were £325. Five of the schemes had been adopted at the preceding meeting.

In reply to another question by Mr. J. W. Gilbert, in reference to the lighting of tramcars during the darkened period, Mr. Hume said that a number of experiments had been made, and the Commissioner of Police had approved a scheme by which passengers would have sufficient light to read and the conductors to issue tickets and give change, and the standard so fixed was being adopted as rapidly as circumstances permit. Conductors were instructed to call out the names of stopping places.

In the course of a debate on the allocation of improvement charges to the tramways account,

Mr. H. H. Gordon said in principle this was bad because all taxation of means of transit was economically unsound, particularly in the case of tramways when other forms of road locomotion were exempt. Tramways having the exclusive use of a portion of the road paid for the upkeep of the track and paving charges. It was not proposed to allocate a portion of the improvement charges on motor 'buses in whose interest the widenings were effected as much as in the interests of the tramways. Hence, it must be unsound to put the charge on tramways only, because it was not really the tramway undertaking which suffered, but the passengers were penalised. By this policy, the Council were really telling people it was cheaper to ride on the motor 'buses. How anything so illogical could be persisted in passed comprehension.

Mr. A. Taylor (chairman of the Improvements Committee) defended his recommendations on the ground that they were only "little ones," and the charge on the tramways account duly went through on a narrow division.

LONDON TRAFFIC FATALITIES.

In answer to a question by Mr. Kellaway in the House of Commons, the Home Secretary has given the following figures of street traffic fatalities in the Metropolitan Police area:—

	1914.			
	July.	Aug.	Sept.	Oct.
Horse-drawn Vehicles	13	9	11	20
Omnibuses	12	8	15	21
Taxi-cabs	2	5	7	6
Tramcars	4	1	4	3
Private Motors	10	13	10	13
Motor Cycles	—	2	3	3
Commercial Motors	10	12	18	18
Totals]	51	50	68	84

The accidents due to tramcars are gratifyingly few, and strongly corroborate the view so often expressed in these columns that tramways are far safer than any other means of public traffic. In the City of London Police area, where comparatively low speeds are enforced, there were only seven fatal cases in the four months—three by motor omnibus, two by horse-drawn vehicles, and one each by motor cycle and heavy motor car.

MISCELLANEOUS NEWS AND NOTES.

South Shields Town Council have unanimously approved the promotion of a Parliamentary Bill by which powers are sought for several tramway extensions.

Tramway Accident at Angoulême.—A Reuter's telegram states that eight persons were killed and twenty injured at Angoulême through a tramcar being derailed and falling over an embankment.

The General Seating Company, Limited, of 13, City Road, London, E.C., ask us to mention that they have large stocks of raw materials for the manufacture of woven rattan, in twill, straight, and fancy weaves, canvas backed and unbacked. The woven material can be supplied in natural glaze, dull finish, or colours, and is manufactured in England by British labour.

Electric Traction in Osaka.—A British Consular report states that there are now 250 miles of double-track electric lines in operation within a radius of 50 miles in Osaka, and that a further 80 miles of line are under construction. The district appears to be suffering from the lack of means of communication, and as soon as the financial stringency is relaxed there, no doubt large extensions will be put in hand.

New Cars at Northampton.—The first of the seven new cars recently ordered by the Northampton Corporation tramways have been received. They provide accommodation for 56 passengers, and have an enclosed upper deck with sliding windows on the rack and pinion system. The interior woodwork of the car is of English oak, ash and pine. Non-slip steps are provided, and there is an up-to-date system of ventilation.

"Commer" Cars and the War.—The Canadian troops which are now stationed at Salisbury Plain have brought with them eight "Commer" cars from Canada. The Indian contingent has another fleet of "Commer" cars, and the British Government has over five hundred in use. Russia has impressed forty of these vehicles, and the French Government have also been making use of "Commer" cars for the transportation of troops in Algiers. The factory of Commercial Cars, Limited, is busily engaged in building its heavier models exclusively for the War Department.

Liverpool Tramways Chairman.—At the first meeting of the newly-constituted Tramways Committee, Mr. E. Russell Taylor was elected chairman, and Mr. Fred Smith, who has been chairman for the past two years and deputy-chairman for many years previously, having consented again to become deputy-chairman, was elected to that position. The Lord Mayor, in welcoming Mr. Russell Taylor to the chair, said that he would certainly have golden opportunities for the display of forbearance, tact and impartiality. He would have a gigantic undertaking to deal with, and there was scope for all the ability members could possibly bring to bear.

Recruiting Cars at Hull.—Mr. W. J. McCombe, manager of Hull Corporation tramways, has recently received the sanction of the Lord Mayor to carry out an interesting scheme in aid of recruiting in which tramcars will be used as travelling information bureaus. Two electric cars are to be run for eight or nine hours daily on various routes for conveying prospective recruits to the City Hall. They will be driven by men in khaki, some of the drivers and conductors in the tramway service being

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frontiersmen, and the cars will be elaborately decorated with the flags of the Allies and notices bearing an invitation to men to "join now." Officials qualified to give advice on all questions of recruiting, rates of pay, separation allowances, pensions, etc., accompany each car to answer all inquiries. A time-table will be published so that the public will be able to know on which route and at what time the cars will be running. No one except young men requiring information on recruiting or those who desire to enlist will be allowed to board the cars.

The Institution of Electrical Engineers.—The following is the list of papers to be read during the first half of the 1914-15 session :—

November 26—"Power Plant Testing." W. M. Selvey.
December 10—"Automatic Protective Switchgear for Alternating Current Systems," E. B. Wedmore.
1915. January 14—"The Shape of the Pressure Wave in Electrical Machinery," S. P. Smith, D.Sc., and R. S. H. Boulding, B.Sc.
" 28—"Lord Kelvin's Work on Gyrostatics," (the Sixth Kelvin Lecture), Prof. A. Gray, LL.D., F.R.S.

Glasgow Tramwaymen at the Front.—Mr. James Dalrymple, general manager of Glasgow tramways, has received a letter signed by a number of Glasgow tramway employees who are now serving with the Expeditionary Force in which the writer says :—

"We wish to tender our sincere thanks to you for your kindness to our wives and children. It gives us all great pleasure to know our dependents are being so well cared for, and it helps us along on many marches to talk to each other about many little incidents that have happened whilst serving under you. I am sorry to say that some of the Corporation servants who came out with us are missing. I have met many men of other corps, notably the R.F.A., who were on the tramways staff when they mobilised. All seem to be in good spirits and health, and anxious to get to the terminus 'Berlin.' Some of our drivers want to get the Kaiser and take him home as a trophy to be given to the Corporation, whilst the conductors want him badly to punch his ticket."

"**Aluminium in the Construction of Automobiles**" is the title of an interesting 16-page pamphlet just issued by the British Aluminium Company, of 109, Queen Victoria Street, E.C. The pamphlet contains much useful information as to the various parts of motor cars which can now be supplied by the company in aluminium. Although intended to cover principally the automobile industry, the information applies also to the construction of tramway and railway cars. The external panelling of these, as well as some internal panels, can now be supplied with a finish which gives a pleasant and distinctive appearance to the cars. The Aluminium Company has also published a pamphlet on "Aluminium in Electric Railway Engineering."

B.E.T. Men at the Front.—Out of 7,432 men employed in the 50 tramway, omnibus, and electrical undertakings (mainly provincial) included in the British Electrical Federation, 757 have gone to the war. The staffs have been encouraged to enlist by the patriotic action of the Federation in promising to keep open their places for them and support their dependents properly in their absence. To ensure the latter, a Mutual Aid Fund was established. The employees remaining at work contribute to it regularly from their wages, and the Federation adds to each contribution an equal sum. Despite the strain on the fund caused by departing subscribers and increasing dependents, the fund is officially returned as being in a very sound condition, with a substantial balance in hand.

Electric Omnibuses in Brighton.—Mr. E. A. Eager, motor superintendent of the Brighton, Hove and Preston United Omnibus Company, Limited, draws attention to an error in a paragraph in our issue of November 5 on "The Progress of the Electric Omnibus." It was there inadvertently mentioned that Brighton was included among several Corporations now using electric omnibuses. Although electric omnibuses have been in service in Brighton since June, 1908, they are not run by the Corporation, but by the Brighton, Hove and Preston United Electric Omnibus Company, and are worked by them in conjunction with their petrol fleet. The electric vehicles number sixteen. Twelve of these are of the same type as the omnibuses used some time ago in London; some of them, in fact, being the same vehicles, and as previously mentioned they are equipped with Tudor batteries.

New Tramway Chairmen.—While the great majority of the tramway committees throughout the country have re-elected the chairmen and vice-chairmen, in a few cases new appointments have been made. Among these are the following:—Aberdeen, Councillor Robertson (chairman); Ayr, Councillor J. R. Learmont (chairman), Bailie Murray (vice-chairman); Bacup, Councillor J. H. Lord (vice-chairman); Barking, Councillor D. Gordon (chairman); Batley, Councillor F. W. H. Auty (vice-chairman); Blackburn, Councillor C. Higham (vice-chairman); Chesterfield, Councillor Woodhead (vice-chairman); Darlington, Councillor C. W. Starmer (chairman); Derby, Councillor Dean (chairman); Kilmarnock, Councillor Jones (chairman); Swindon, Councillor Newman (chairman). Councillor Shawyer (vice-chairman).

Municipal Tramways Association.—At the annual meeting of the Municipal Tramways Association, held at Salford, on Friday, November 13, to which reference was made in our last issue, the Mayor, Alderman Worsley, in welcoming the members, expressed regret that owing to the difficulties created by the war the proposal to hold the next annual conference in Salford was not being carried out. Alderman Linsley, chairman of the Salford Tramways Committee, and president of the Association, said Salford had been hard hit by the war, the loss in tramway receipts having been considerable. That condition of affairs, he thought, was general throughout the country, except, perhaps, at Newcastle and Sheffield, where it was reported the local undertakings were "booming." The loss of receipts to Salford was also in some measure due to the granting of increased stages and cheaper fares. Before the war they had not much fear of the new scale of fares, but since the crisis Salford had lost £500 or £600 per week in receipts. He added that 10,000, or 14 per cent., of the men employed on the tramways of the country had joined or rejoined the colours since the outbreak of war. As mentioned last week, on the motion of Mr. Mozley, general manager of Burnley Corporation tramways, seconded by Mr. C. R. Everson, general manager of Plymouth Corporation tramways, the officers and Council of the Association were re-elected for the ensuing year.

CONTRACTS AND ORDERS.

Messrs. C. Macintosh and Company have an order from Manchester Electricity Committee for one mile of 37/15's cable.

Burnley Electricity Committee have placed an order with the British Insulated and Helsby Cables for the supply of cables.

Melbourne City Council have accepted the tender of the British Westinghouse Electric and Manufacturing Company for new blading for the 750 kw. s.p. turbines.

Anger Brake Adjuster.—We understand that the trucks for the six new cars now being built by the Brush Company for the Wallasey Corporation are being equipped with the Anger improved automatic brake adjuster, and not with another type of adjuster referred to in a recent note on the Wallasey cars.

PERSONAL.

Bradford Tramways Committee.—Mr. E. Priestley has been re-elected chairman and Mr. S. Neumann deputy-chairman of the Tramways Committee.

Leeds Tramways Committee.—Alderman R. A. Smithson has been re-elected chairman of the Tramways Committee, and Alderman J. Brown deputy-chairman.

Salford Tramways Committee have re-appointed Alderman Linsley as chairman and Council Barrett as deputy-chairman of the Tramways Committee for the ensuing year.

Mr. P. H. Marco, general manager of the Barnsley and District Electric Traction Company, Ltd., has received a commission as lieutenant in the Barnsley battalion of the York and Lancaster Regiment.

Mr. W. B. Nantel has been appointed a member of the Canadian Railway Commission, in succession to Mr. N. E. Bernier. The commission has certain duties in connection with electric railways and tramways.

Mr. Arthur Coveney, who has been manager of the Erith tramways since their inception in 1905, and chief engineer of the Erith Council's electricity works during the past four years, has resigned these positions on accepting another appointment.

Mr. P. Walter d'Alton, M.Inst.C.E., M.I.Mech.E., M.I.E.E., for many years chief mechanical engineer on the staff of Messrs. Dick, Kerr and Company, has opened offices at Cross Keys House, 56-58, Moorgate Street, E.C., and begun practice as a consulting and inspecting engineer.

Mr. F. Riley, power station superintendent of the Rawtenstall electricity works, has been appointed resident engineer to the new Whalley Asylum at a salary of £275 per annum. There were 470 applicants for the position. Mr. Riley was previously with the Stalybridge, Hyde, Mossley, and Dukinfield Tramways and Electricity Board.

Mr. William C. May, who has been appointed chief traffic manager to the Great Eastern Railway, will have control of the whole of the passenger, goods and mineral traffic. Mr. May, who was born in 1869, was educated at Cranleigh School, and entered the service of the Great Eastern Railway in 1886. Seventeen years later he was appointed mineral manager, and goods manager in 1910.

Mr. P. D. Thomas, I.S.O., who has for many years been in the service of the Board of Trade, is now about to retire from that department. The Municipal Tramways Association and the Tramways and Light Railways Association have jointly sent to the President of the Board of Trade the following letter :—"We are instructed on behalf of the Executive Committees of our two Associations to say that they are anxious to avail themselves of this opportunity to express to you, sir, on behalf of all their members, their very sincere appreciation of the never failing courtesy and kindness which they have at all times received at the hands of Mr. Thomas, and to place on record their regret that his long and faithful services as a public servant should be coming to an end." The letter is signed on behalf of the Councils of the Associations by Mr. A. de Turckheim, secretary of the Tramways and Light Railways Association, and Mr. C. J. Spencer, hon. secretary of the Municipal Tramways Association.

FINANCIAL REPORTS AND MEETINGS.

Electric Construction Company.—An interim dividend at the rate of 7 per cent. per annum on the preference shares for the half-year ended September 30 with be paid on November 30.

Motor Omnibuses at Bournemouth.—The motor omnibus service of the Corporation tramways from April 1 to September 30 resulted in total receipts of £950. The mileage run was 23,210, and the passengers carried 222,624. Receipts averaged 9.62d. per car mile, and the expenses 9.484d. per car mile.

Provincial Tramways Company.—Final dividend of 10d. per share on the ordinary shares, making with the interim dividend paid in June 1s. 6d. per share on the ordinary shares, or 7½ per cent. per annum for the year ended September 30. The directors have set aside £12,000 for reserve and depreciation and £2,000 as a reserve for third-party insurance or for other purposes. The amount to be carried forward will be about £4,035.

Bournemouth Tramways.—The report of the general manager, Mr. I. Bulfin, on the working of the tramways for the six months

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ended September 30, 1914, stated that the receipts were very satisfactory up to August 1, showing an increase on the previous year of £1,850. The outlook for August and September was very promising, as ten new cars were ready for service. The declaration of war, however, had seriously affected Bournemouth, as the London and South Western Railway was practically commandeered by the Government for the transport of troops, and no excursion trains were run from August 1 to September 1. In addition to these drawbacks, 120 men, representing more than 25 per cent. of the staff, joined the colours. Immediate steps were taken to reduce the services on all routes, and the decrease in receipts was thus met by a decrease in expenses. The very generous action of the committee in granting half-pay to the men during their absence with the colours will represent an increase in expenses of about £450. Contracts, such as coal, etc., depending on war clauses were at once annulled, but by prompt action and knowledge of the market and supplies, satisfactory arrangements were made at very slight increase in cost. The working expenses given (£31,648 18s. 5d.) include the extra cost of all materials due to the war, the sum of £450 paid to men who joined the colours, and the concession of 56 to 54 hours per week; yet, in spite of these extras, the expenses show a decrease of over £1,000 on last year's period. The gross balance works out at £25,647 2s. 4d., as against £28,344 12s. 10½d., being a decrease of some £2,700 on last year's figures. Although there will be increased capital charges to be made for the present year, Mr. Bulfin anticipates that the year's balance sheet will show a substantial profit.

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 57 of the principal undertakings of the United Kingdom for the week ended November 14 give total receipts of £212,382, or £1,900 more than in the corresponding week last year. The total length of track was 2,630 miles, or 24 more than for the corresponding week. The receipts this year were at the rate of £80 15s. 0d. per mile of track, and last year at the rate of £80 15s. 4d., thus giving a decrease for the past week of 4d. per mile open.

Coal Market.—Owing to the difficulties of navigation and scarcity of supplies in consequence of the demand of the Allied Admiralties, quotations can now be given only at time of actual delivery.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Anglo-Argentine	Nov. 11	£59,095	£52,884	45	£2,428,280	— 467,013
Auckland (28 days)	Sept. 25	19,945	20,995	12	65,350	+ 3,797
Ballarat and Bendigo	Aug. 16	3,166	3,055	20	17,282	— 248
Brazilian St. Rly. Mlrs.	May	44,820	50,237	43	523,872	+ 76,626
Brazilian Trctn. Mlrs.	Sept.	6,028,078	6,096,940	39	55,170,088	+1,346,273
Brisbane	October	27,250	28,763	43	288,621	+ 28,603
British Columbia $	Sept.	734,283	650,516	13	2,015,851	— 245 503
Buenos Aires Pt. & City	June	6,791	6,733	26	43,250	+ 3,143
Buenos Aires Lacrose	July	45,221	43,327	4	43,327	— 1,894
Calcutta Rs.	Nov. 14	69,814	60,079	45	30,22,497	+ 57,661
Cape Town	June	11,560	12,742	52	155,466	+ 13,249
Carthagena & Herreras	October	1,582	1,543	43	22,688	— 3,555
Cordoba	Sept.	13,343	12,384	26	82,058	+ 1,338
East India	October	1,878	2,007	13	6,099	+ 188
Kalgoorlie	Sept.	3,068	2,864	38	23,980	— 2,467
La Plata	Sept.	4,528	4,190	39	41,852	— 3,659
Lima	August	33,939	29,800	35	271,607	+ 5,102
Lisbon Mlrs.	July	164,715	171,179	31	1,143,064	+ 45,838
Madras (14 days) Rs.	Oct. 15	26,161	24,042	41	5,41,291	+ 30,947
Manila	June	133,500	132,500	26	833,569	+ 14,513
Manaos	June	12,590	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	387,500	+ 7,000
Mexico $	Sept.	604,744	667,421	39	5,513,765	+ 397,434
Montevideo	Sept.	27,870	25,227	47	884,945	— 9,336
Para	August	34,485	19,354	30	189,916	— 88,540
Port Elizabeth	June	3,288	3,212	52	44,931	+ 1,901
Puebla $	Sept.	51,100	52 200	39	534,500	+ 18,800
Rangoon	October	5 963	4,600	48	50,657	— 942
Shanghai $	July 29	31,163	24,600	30	720,340	+ 94,215
Singapore $	Oct. 8	12 241	9,797	39	457,768	— 18,658
Toronto $	Sept.	865,796	879,321	39	7,822,107	+ 438,637
Winnipeg $	Sept.	331,732	310,996	39	3,071,940	+ 90,506

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	Latest Return. 1914.	Latest Return. Incr. or Dec.	Aggregate. Wks	Aggregate. 1913-4.	Aggregate. Increase or Dec.
Aberdeen Corporation	Nov. 11	£1,618	£1,728	+ £110	24	£40,765	+ £691
Accrington Corp.	,, 11	563	477	— 86	32	17,866	— 852
Ayr Corporation	,, 14	243	230	— 13	26	10,889	— 917
Bath Electric	,, 11	825	845	+ 20	45	44,069	+ 108
Birkenhead Corp.	,, 15	1,232	1,199	— 33	32½	41,636	— 1,275
Birmingham Corp.	,, 14	12,649	12,009	— 640	38	398,764	+ 12,134
Blackburn Corporation	,, 11	1,229	1,022	— 207	38	43,896	— 240
Blackpool Corporation	,, 12	535	558	+ 23	33	63,024	— 9,984
Bolton Corporation	,, 15	2,738	2,434	— 304	38	90,854	— 129
Bournemouth Corp.	,, 18	1,644	1,693	+ 49	38	69,686	— 3,920
Bradford Corporation	,, 14	5.569	5,936	+ 367	33	206,652	+ 9,115
Brighton Corporation	,, 15	903	846	+ 57	32½	38,600	— 250
Bristol	,, 13	7,587	7,926	+ 389	45½	390,198	+ 22,033
British Elec. Federatn.	*	...	...	...	...	...	...
Burnley Corporation	Nov. 14	1,654	1,305	— 349	33	51,693	— 5,258
Burton-on-Trent Corp.	,, 15	297	287	— 10	33	9,973	+ 270
Bury Corporation	,, 15	1,276	1,155	— 125	32½	46,028	+ 781
Cardiff Corporation	,, 14	2,642	2,441	— 201	32	91,855	+ 723
Chatham and District	,, 12	873	1,033	+ 160	45	43,656	+ 1,398
Chesterfield Corp.	,, 12	256	244	— 12	32	8,845	+ 357
Colne Corporation	,, 14	256	204	— 52	...	...	...
Cork Electric	,, 12	483	476	— 7	45	22,745	— 79
Croydon Corporation	,, 6	1,625	1,653	+ 28	31	55,830	+ 2,123
Darlington Corporation	,, 14	246	237	— 9	33	8,780	+ 504
Derby Corporation	,, 14	1,050	974	— 76	32½	33,678	+ 766
Dover Corporation	,, 14	207	220	+ 13	33	8,655	— 60
Dublin & Lucan	,, 13	106	120	+ 14	19½	2,968	— 25
Dublin United	,, 13	4,785	5,640	+ 555	45	266,735	+ 16,638
Dundee City	,, 11	1,258	1,264	+ 6	25½	33,712	— 497
East Ham Corporation	,, 14	1,016	1,201	+ 185	32½	37,553	+ 5,050
Exeter Corporation	,, 13	311	317	+ 6	33	11,964	+ 214
Gearless Motor 'Buses.	*	...	...	...	...	...	...
Glasgow Corporation	Nov. 14	20,648	20,227	— 421	23	485,470	+ 2,769
Glossop (U. Elec. Supply)	,, 14	123	99	— 24	46	5,609	— 866
Halifax Corporation	,, 10	1,879	2,104	+ 225	32	72,891	+ 2,897
Hastings & District	,, 11	818	852	+ 34	45	46,673	— 2,684
Huddersfield Corp.	,, 14	2,071	2,353	+ 282	33	92,018	+ 7,791
Hull Corporation	,, 14	3,243	2,984	— 259	33	109,770	— 881
Ilford U.D.C.	,, 14	447	578	+ 131	32	18,668	+ 3,727
Ilkeston Corporation	,, 18	133	116	— 17	38	4,379	— 190
Ipswich Corporation	,, 14	416	387	— 29	33	15,686	— 209
Isle of Thanet	,, 14	342	305	— 37	6	2,528	— 342
Kilmarnock Corp.	,, 15	165	151	— 14	26	4,350	— 364
Lanarkshire	,, 12	1,786	1,741	— 45	45	84,911	+ 7,338
Lancashire United	,, 11	1,551	1,487	— 64	45	74,097	+ 3,787
Leeds City	,, 14	7,969	8,016	+ 47	33	273,669	+ 774
Leicester Corporation	,, 14	2,865	2,736	— 129	46	130,728	+ 2,413
Leith Corporation	,, 14	659	677	+ 18	26	19,371	+ 261
Leyton U.D.C.	,, 5	1,299	1,399	+ 100	30	42,960	+ 1,885
Liverpool Corporation	,, 14	12,967	12,655	— 312	45½	599,239	+ 9,950
Llandudno & Colwyn B.	,, 18	151	159	+ 8	50	15,325	— 2,037
London County Council	,, 11	48,523	47,046	+ 3,523	32	1,424,488	+ 66,516
London Gnl. Omnibus.	*	...	...	...	...	...	...
London United	*	...	...	...	...	...	...
Lowestoft Corporation	Nov. 7	197	198	+ 1	5	1.026	— 108
Maidstone Corporation	,, 12	184	191	— 8	33	7,194	+ 218
Manchester Corp.	,, 14	17.416	16,678	— 743	38	571,916	— 7,274
Met. Elec. Trys.	*	...	...	...	...	...	...
Nat. Steam Car Co., Ld.	Nov. 14	3,589	3,728	+ 139	2	7,783	+ 634
Nelson Corporation	,, 14	215	148	— 67	32½	6,818	— 736
N'castle-on-Tyne Corp.	,, 14	5,015	5,636	+ 621	33	179,286	+ 18,350
Newport (Mon.) Corp.	,, 14	776	734	— 42	33	27,371	+ 1,846
New St. Helens & Dist.	,, 11	747	859	+ 112	19	18,789	+ 1,778
Northampton Corp	,, 18	541	575	+ 34	32	19,562	+ 213
Nottingham Corp.	,, 12	3,334	3,279	— 55	32½	111,663	+ 1,503
Oldham Corporation	,, 8	2,174	1,954	— 220	33	73,403	+ 24
Portsmouth Corp.	,, 14	1,996	2,086	+ 90	38	82,188	...
Preston Corporation	,, 11	838	886	+ 48	33	30,472	+ 958
Provincial	,, 14	1,689	1,920	+ 231	6½	13,005	+ 1,624
Reading Corporation	,, 12	742	646	— 96	32	23,385	+ 407
Rhondda	,, 12	1,219	1,149	— 70	45	55,814	+ 1,201
Rochdale Corporation	,, 14	1,545	1,456	— 89	33	54,324	+ 508
Rotherham Corp.	,, 18	1.017	924	— 93	38	34,551	+ 1,076
Salford Corporation	,, 16	5,084	4,527	— 557	32	166,535	— 6,613
Sheffield Corporation	,, 15	7,681	7,525	— 156	33½	259,974	+ 6,996
Southampton Corp.	,, 11	1,241	1,185	— 56	33	44.176	— 65
Southend-on-Sea Corp.	,, 11	702	697	— 5	33	36,285	+ 2,356
South Met. Trys.	*	...	...	...	...	...	...
South Shields Corp.	Nov. 14	661	671	+ 10	32½	25,586	+ 1,647
Sunderland Corp.	,, 13	1,317	1,270	— 47	33	49,845	+ 908
Sunderland District	,, 4	559	517	— 42	1	517	+ 42
Swindon Corporation	,, 11	158	172	+ 14	32	5,894	+ 412
Torquay	,, 5	432	394	— 38	44	25,374	— 3,598
Trys. (M.E.T.) 'Buses	*	...	...	...	...	...	...
TynesideTrys. & Tmrds	Nov. 11	458	554	+ 96	20	12,557	+ 1,950
Wallasey Corporation	,, 14	1,101	1,067	— 34	32½	42 765	+ 1,349
Walsall Corporation	,, 14	656	643	— 13	45	28,790	+ 161
Walthamstow U.D.C.	,, 14	708	736	+ 28	33	27,367	+ 2,531
Warrington Corp.	Oct. 29	442	415	— 27	30	11,842	— 334
West Ham Corporation	Nov. 12	2,738	2,834	+ 96	32	92,324	+ 3,465
Wigan Corporation	,, 12	1,550	1,362	— 188	32	47,551	— 1 085
Wolverhampton Corp	,, 18	1,029	1,011	— 18	34	35,418	— 1.016
Yorkshire (W. Riding)	,, 15	1,442	1,489	+ 47	46	66,942	+ 113

* Issue of Traffic Returns suspended during the War.

DICK, KERR & CO.,
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THE

Tramway & Railway World

Vol. XXXVI. No. 27. LONDON, SATURDAY, NOVEMBER 28, 1914. [Established in 1892.

ANNUAL SUBSCRIPTION (Postage Prepaid)—in the United Kingdom, 25s.; for all places abroad, 30s.

Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

WEEKLY LIST OF TENDERS INVITED.

GREAT NORTHERN RAILWAY COMPANY (IRELAND).

The Directors are prepared to receive tenders for 80 Covered Goods Wagons, 8 Ballast Wagons, and 3 Ballast Train Vans.

Copies of the specifications, drawings, and forms of tender can be obtained on application to the Secretary, at Amiens Street Terminus, Dublin, on payment of a fee of 10s., which will be refunded on receipt of a *bona-fide* tender and the return of the drawings.

Tenders, under cover, marked "Tender for Wagons," should be delivered to the undersigned not later than 10 a.m. on Monday, December 21, 1914.

The Directors do not bind themselves to accept the lowest or any tender.

T. MORRISON,
Secretary.

Secretary's Office,
Amiens Street Terminus, Dublin,
November 25, 1914.

TO MANUFACTURERS ONLY.

The Commissioners of His Majesty's Works, etc., are prepared to receive tenders for the

Supply of Electric Cable and Wire

during a period of one year from January 1, 1915.

Forms of tender, conditions of contract, and all particulars may be obtained on application to The Controller of Supplies, H.M. Office of Works, 18, Queen Anne's Gate, Westminster, S.W.

The Commissioners do not bind themselves to accept the lowest or any tender.

Tenders must be delivered before 11 a.m. on Monday, December 7, 1914, addressed to the Secretary, H.M. Office of Works, etc., Storey's Gate, London, S.W., and endorsed "Tender for Electric Cable and Wire."

H.M. Office of Works, etc.,
November 25, 1914.

MADRAS AND SOUTHERN MAHRATTA RAILWAY CO. (LTD).

The Directors are prepared to receive tenders for :—

(1) Steel Rails (about 4,018 tons),
(2) Steel Fish-Plates (about 137 tons),
(3) Steel Sleepers and Keys (about 2,850 tons)

in accordance with the specifications, which may be seen at the offices of the Company. The charge for each specification will be one guinea, which will not be returned.

Tenders must be sent in, addressed to the Secretary, not later than 2 p.m., on Tuesday, December 1, 1914, marked "Tender for Steel Rails," or as the case may be.

The Directors do not bind themselves to accept the lowest or any tender.

Company's Offices :
91, York Street, Westminster, S.W.,
November 18, 1914.

THE PROPRIEORS OF THE PATENTS Nos. 25012 of 1910 for "Improvements in or relating to Collectors for Overhead Conductor Electric Traction Systems"; 27708 of 1910 for "Improvements in or relating to Collectors for Electric Traction on the Overhead Conductor System"; 3747 of 1911 for "Improvements in Supports for Electric Conductors or Railless Track Systems"; 4397 of 1911 for "Improvements relating to Overhead Electric Trolley Wire Construction," are desirous of entering into arrangements by way of license and otherwise on reasonable terms for the purpose of exploiting the same and ensuring their full development and practical working in this country. All communications to HASELTINE, LAKE AND CO., Chartered Patent Agents and Consulting Engineers, 28, Southampton Buildings, Chancery Lane, London, W.C.

COUNTY OF LONDON.

The London County Council invites tenders for the provision of Two Steam Turbo-Generators of 8,000 kw. capacity with auto-transformers, etc., for the Greenwich Generating Station in connection with the London County Council Tramways.

The specification, bills of quantities, form of tender, etc., may be obtained from the Clerk of the Council, at the County Hall, Spring Gardens, S.W., after payment to the Cashier of the Council of £2. This amount will be returnable only if the tenderer shall have sent in a *bona-fide* tender, and shall not have withdrawn the same. The contract documents may be inspected before the payment of the fee.

The person whose tender is accepted will be bound by the contract to pay wages at rates not less, and to observe hours of labour not greater, than the rates and hours set out in the Council's list. Particulars of the Council's Standing Orders as to its conditions of tender and contract are given in every issue of the *London County Council Gazette*. No tender received after 11 a.m. on Tuesday, December 22, 1914, will be considered. The Council does not bind itself to accept any tender.

LAURENCE GOMME,
Clerk of the London County Council.

County Hall, Spring Gardens, S.W.

COUNTY BOROUGH OF WALSALL.

The Walsall Corporation invite tenders for the supply, delivery, and erection of :—

Six 250 kw. Rotary Converter Equipments.
One 509 kw. Rotary Converter Equipment.

Copies of the specification, formal conditions, etc., may be obtained upon application to the Consulting Engineer, Mr. E. M. Lacey, M.I.C.E., 12, Victoria Street, Westminster, London, S.W., on payment of three guineas, which will be returned on receipt of a *bona-fide* tender.

Extra copies of the specification may be obtained on payment of half-a-guinea, which will not be returned.

Tenders, sealed and endorsed on the outside "Tender for Electricity Works, Contract No. 9," to be addressed to the Town Clerk, Walsall, and delivered not later than 10 a.m. on Tuesday, December 8, 1914.

The Corporation do not bind themselves to accept the lowest or any tender, and they will not accept the tender of any firm or person paying less than the standard rate of wages to their workmen.

By order, HERBERT LEE,
Town Clerk.

Council House, Walsall,
November 18, 1914.

CITY OF WINCHESTER.

The Electricity Committee of the Winchester Corporation are prepared to receive tenders for the supply, delivery and erection of

One 500 Kilowatt, Direct Current, Turbo-Generator, complete with Condensing Plant, Pipework, etc.

Specifications, drawings and forms of tender may be obtained on or after November 26 next, on application to Mr. R. Ayton, A.M.I.E.E., City Electrical Engineer, Electricity Works, Winchester, on payment of a fee of three guineas for each specification, which amount will be returned on receipt of a *bona-fide* tender.

Tenderers will be asked to submit, in addition, an offer for three Belliss-Parker steam dynamos now installed in the power station, which it is proposed the turbo-generator will replace.

Tenders, sealed and endorsed on the outside "Tender for Generator, Electricity Works," to be delivered at the Guildhall not later than 12 mid-day, Thursday, December 17, 1914.

The Corporation do not bind themselves to accept the lowest or any tender received.

THOMAS HOLT,
Town Clerk.

The Guildhall, Winchester,
November 17, 1914.

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CORPORATION OF SOUTHEND-ON-SEA.

CHASSIS.

The Corporation of Southend-on-Sea invite tenders for the supply of Three Chassis for existing bodies. Further particulars can be obtained from Mr. Robert Birkett, Borough Electrical Engineer and General Manager, London Road.

POSITIONS VACANT.

CITY OF BIRMINGHAM.

ELECTRIC SUPPLY DEPARTMENT.—APPOINTMENT OF SHIFT ENGINEER.

Applications are invited for the position of Shift Engineer at the Summer Lane Electric Generating Station.

Applicants must have had a sound mechanical and electrical engineering training and must have had previous experience of a similar kind in a large electric generating station from which extra-high-tension, three-phase and low-tension direct-current supplies are given.

The commencing salary will be £150 per annum, rising at the discretion of the Committee to a maximum of £250 per annum.

Applications, made on forms which can be obtained from the Secretary of the Electric Supply Department, and accompanied by not more than three testimonials as to experience, ability and character, must reach the undersigned not later than Wednesday, December 4, 1914.

R. A. CHATTOCK,
City Electrical Engineer and Manager.

Electric Supply Offices,
14, Dale End, Birmingham.

CITY AND COUNTY BOROUGH OF BELFAST.

SHIFT ENGINEER.

The Tramways and Electricity Committee are prepared to receive applications from candidates between the ages of 30 and 45 for the position of Shift Engineer in their electric generating station.

Applicants must be thoroughly qualified engineers of not less than six years' practical experience of the operation of steam plant. They must have occupied responsible positions, involving the care of steam turbines of not less than 1,000 horse power. A knowledge of electrical machinery is desirable, though not essential. Wages will be paid weekly, at the rate of £4 for seven shifts of eight hours each.

Time of duty will be varied each week by eight hours.

Applications to be made only on the form obtainable from, and returnable to, the City Electrical Engineer, East Bridge Street, Belfast, and must be received by him on or before December 12, 1914, accompanied by copies of three recent references, which will not be returned. Canvassing, directly or indirectly, will be regarded as a disqualification.

R. MEYER,
Town Clerk.

TRAMWAY SUPPLIES, Ltd.,
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Sole Selling Agents for S. Dixon & Sons' Tramway Material,
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TO
JOSEPH THOMPSON,
COLUMBIA WORKS, 106, Eyre Street, SHEFFIELD.
Telegrams: "Insulator, Sheffield."
Engineers' Specifications worked to.

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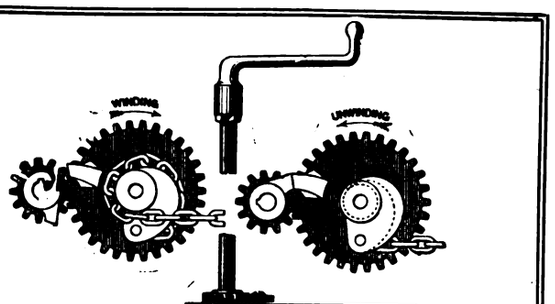

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Note the simplicity of the Radial Contact pieces which render this the quickest of all geared hand brakes by
(1) Preventing the drum from over-running on release;
(2) Stopping the drum always at the point from which recovery of chain is most rapid;
(3) Eliminating all idle turning of the handle.
THE "PEACOCK" BRAKE CO., 27, CLEMENTS LANE, LONDON, E.C.

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THE
Tramway AND Railway World

Established in 1892 and Published by

THE TRAMWAY & RAILWAY WORLD PUBLISHING CO., Ltd.,
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One Shilling per Single Copy.

FOR ALL PLACES ABROAD—Thirty Shillings per Annum.

SATURDAY, NOVEMBER 28, 1914.

UPPER DECK SEATS.

In all the arrangements of the modern tramcar which directly relate to the comfort and convenience of passengers, there is one which, more than any other, gives rise to irritation and often to wrath. This is the fact that the cross seats on the upper deck are too short, and the longitudinal aisle or gangway between them too narrow. Each seat is intended for two passengers, and if the passengers are of slender proportions, it suffices. But in the case of average adult individuals, the passenger next the gangway often finds that he has only a foot or less of the seat available for him. On this at much discomfort he has to balance himself as well as he can, and he has to take special pains in this direction when the car body sways in rounding curves. That, however, is not the worst. The passenger so situated finds that it is not possible to prevent his shoulder from projecting considerably beyond a vertical line drawn from the end of the seat, so that he occupies part of the gangway which in itself is very narrow. A passenger on the seat opposite may be in a similar position, so that the shoulders of the two nearly meet across the gangway. People entering or leaving have to force their way past, and the projecting passenger feels as though his coat will be torn off or that he may be wrenched bodily off the seat. The constant perambulations of the conductor produce a similar effect, though often in a minor degree, because the conductor has learned the art of wriggling through. The unfortunate passenger tries to relieve the situation by jamming himself more closely against the passenger next the side of the car, but the only result of that is to spread the irritation and discloselyagainst the passenger next the side of the car, but himself in the corner. On first sight, the obvious remedy for all this would be to make the car wider, so that the seats might be longer and the gangway more roomy. But the present overhang of car bodies outside the rail line appears to be as great as the regulations allow, so nothing can be hoped for in that direction. It is to be observed that since the advent of roof covers the trouble is much more marked because the side framing of the canopy takes up appreciable space, and, moreover, it prevents the shoulder of the passenger next it from projecting slightly beyond the lateral line of the car. These circumstances apply in the case of tramways of standard gauge. On narrow gauge lines things are not quite so bad, as the seats on one side of the aisle are only for one passenger each, but of course the total seating capacity is reduced. Even if a greater overhang of car body were allowed, it could not in many cases be adopted, because the two tracks are often so close together that the clearance between cars passing one another is little enough as things are. There is also the special case of sharp curves, where with a given distance between tracks great care has to be taken to see that there is sufficient clearance. The only remedy, therefore, is to modify the seating arrangements, and the difficulty is to do so without materially reducing the number of seats available. Staggering the two rows of seats so that each seat would be opposite the space between seats at the other side of the gangway is not very promising. Managers will accordingly watch with interest an experiment embodying a new arrangement now beginning in Glasgow. In this case, instead of a fixed seat for two people, there are two separate seats or chairs, the one nearest the gangway being slightly behind (or in front of, as the case may be) the other. The seats and their backs are made to swivel round. In this way the shoulders of the two passengers can overlap, each person has full room, and, besides, the gangway is comparatively clear. Readers who have not an opportunity of inspecting this car at present will find a description of it with drawings in our next illustrated issue. The design certainly looks very promising.

MANCHESTER TRAMWAYS AND THE WAR.

Referring to advertisements in Manchester tramcars of the needs of the Army and the necessity of raising large sums for various war funds, the local *Evening News* says that some fine work has been done in this way in Manchester with all the resources and ingenuity of an up-to-date advertising agent.

So well has the publicity campaign been carried on that the impression has got abroad that an expert in this particular line has been called in for the especial purpose of making tramcars useful as a means of a public appeal. As a matter of fact the Tramways Department, much to its credit, has been solely responsible, and Mr. J. M. M'Elroy, the general manager, has been the leading spirit throughout. Nothing like this advertising by a municipal department has ever been seen before, and its success has made it well worth while.

Nearly £5,000 has been raised, for instance, for the various war funds by contributions placed in the little collecting boxes on the cars. How many recruits have been drawn to the colours by the insistent and compelling appeals to their manhood and patriotism conspicuously displayed in every car it would be impossible to say, but the number must have been considerable.

"Do it now"! "Do something; Fight or Give"! are some of the catchwords which are being effectively used. And lest some scoffer should ask what the Tramway Department itself is doing for the war and the war victims, there is a poster informing him that nearly 1,000 of its employees have joined the army, that their dependents are receiving nearly £700 per week from the department, and that the tramway workers are contributing £100 a week to the Local Relief Fund.

TRAMWAYS AND THE WAR.

Mr. W. E. Hardy, the manager of the Bath Electric tramways, as president of the tramway men's institute, has inaugurated a new miniature rifle range which has just been installed for the use of all employees of the company. Up-to-date, and fully equipped, it is placed in the basement of the power station where the men will be able to devote themselves regularly to what is not only a recreation but an acquisition to any man especially at the present time with the war cloud hanging over the nation. The range is 18 yards long and was opened in the presence of an enthusiastic crowd of potential marksmen.

Mr. Arthur Ellis, tramways manager and engineer of Cardiff Corporation tramways, recently stated to the Tramways Committee that the payment of the difference between Army pay and what the employees received from the Corporation as wages had cost the city £844 since the commencement of the war. About 150 men had joined the forces, and it was with some difficulty that the service was now being maintained, although 60 new men are being trained at present.

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Babcock and Wilcox, Limited, have presented two standard motor ambulances to the British Red Cross Society for service at the front. One of these has been given by the company and the other by the directors and staff. The subscription raised by the latter was some £50 in excess of the £400 required for the ambulance, and it is proposed to present this sum to the Society to go toward the cost of another ambulance.

Sheffield Tramways Department are asking for applications from married men capable of filling the position of conductor on the tramways to replace men who have joined the Army and Navy. Up to Tuesday last 260 tramway employees had enlisted, and the Special Committee dealing with this matter have made them allowances which in the aggregate amount to about £9,300 per annum.

Forty-five employees of the tramways and electricity department of the Blackpool Corporation are now serving in various branches of the Army.

BRITISH COMPANIES AND ALIEN ENEMIES.

Questions arising under recent legislation as to trading with the enemy were raised in an action which was decided in the King's Bench Division of the High Court on Monday last. The Continental Tyre and Rubber Company (Great Britain), Limited, brought a claim against Thomas Tilling, Limited, for £5,700 for tires supplied before the outbreak of war to the defendants for motor omnibuses and other vehicles. The great bulk of the plaintiffs' shareholders were Germans. The defendants contended that the plaintiffs were not entitled to bring any action during the war, because any money paid to them would inure for the benefit of the German shareholders, who were alien enemies. It was said that the decision would affect many companies in a similar position in England.

Mr. Justice Lush said that the plaintiffs were a branch of a parent company in Germany, and practically all the shares were held by Germans. It appeared to his Lordship that the argument for the defendants that it was unlawful to make a payment for the benefit of an alien enemy, as it would go into the pockets of German shareholders, involved the proposition that it was unlawful for a British subject to trade in England with the plaintiff company. The right to trade with a company occupying plaintiffs' position was recognised and sanctioned by the emergency legislation, and therefore he thought the defence failed. Being recognised and permitted by Proclamation, trading with plaintiffs was permissible and lawful. The goods in this case were not sold nor the money received by the plaintiffs in the capacity of an alien enemy, seeing that their agent was resident here, and there was no intention to remit any money to Germany. The action was maintainable, and there would be judgment for the plaintiffs, for a sum to be ascertained. His Lordship gave leave to appeal.

SWALEDALE LIGHT RAILWAY SCHEME.

The Light Railway Commissioners, having submitted to the Board of Trade for confirmation the order for the construction of a light railway from Richmond to Reeth in the North Riding, it is probable that the construction will be commenced without much delay. It is not likely that any objections will be made to the Board of Trade. All the local authorities concerned and the Treasury are in favour of the scheme, and it has been very strongly supported by agriculturists in the district. The total capital is to be fixed at £60,000, of which the Treasury will advance a portion, and the local authorities will also assist. The balance will be private capital. The line will be 10 miles long, and will connect with the North Eastern Railway Company's terminus at Richmond and follow the River Swale for its whole course as far as Fremington, the station for Reeth. The railway will be a surface line, and presents no engineering difficulties. It is provided in the order that the line shall be worked in perpetuity by the North Eastern Railway Company.

L.C.C. TRAMWAY MATTERS.

At the meeting of the London County Council on Tuesday the Highways Committee reported that the traffic receipts for the week ended November 11, 1914, amounted to £47,046. For the corresponding week last year the receipts were £43,523, leaving an increase of £3,523. The total traffic increase since April 1 to date is £66,517.

RATES OF PAY OF ARMATURE WINDERS.

The armature winders employed in the rolling stock section of the tramways department have asked that their rate of pay, now 10d. an hour, should be increased by 1½d. per hour. The Highways Committee have declined to grant the increase, and the men have now asked that their application should be referred to the Rolling Stock Conciliation Board, and this has been done.

All tramway reports were adopted.

Mr. W. C. Johnson asked what was the actual cost of the expert advice obtained in respect to the tramway schemes emasculated by the Council on the 10th inst. and of the preparation of the plans, printing, schedules, and also the cost of the time employed on the schemes by the chief and other officers of the tramways.

Mr. G. H. Hume (chairman of the Highways Committee) replied that the total cost of the preparation of the general scheme for London tramway development was about £1,200, viz., experts, £325; salaries and wages of engineers' department, £664; printing, £130; maps and incidentals, £82. This did not take into account the time of the officers in the preparation of the scheme, the cost of which it would be very difficult to give in actual figures. He had every reason to believe that not a single penny of the sum expended was wasted.

MISCELLANEOUS NEWS AND NOTES.

Edinburgh Corporation is to purchase an electric motor lorry for the use of the electricity department.

Brighton Tramways Committee recommend the Corporation to apply for sanction for a loan of £4,000 for extensions and tramway improvements.

Parcels System at Blackpool.—A system of parcels delivery is to be introduced on the Blackpool, the Blackpool and Fleetwood and the Blackpool, St. Anne's and Lytham tramways. The parcels are not to exceed 28lbs.

Edinburgh Tramways Extension.—A Provisional Order which the Corporation has promoted in the present session includes powers for the contruction of new tramways in Colenton and Corstorphine parishes.

Brighton-Hove Trolley Scheme.—Hove Council have declined the proposed conference with Brighton Corporation on the scheme for the equipment of certain through trolley omnibus routes. It will consequently be necessary to go to arbitration.

Glasgow Electricity Committee has asked the chairman and the engineer for a further report in connection with the renewal of contract with the Tudor Accumulator Company for the maintenance of the battery at Port Dundas generating station.

Dundee Corporation Tramways propose to purchase an acetylene welding plant at a cost of about £80, and a similar plant for rail cutting at £40. Mr. Peter Fisher, the manager, recently reported to the Tramways Committee that the cost of working would amount to 11s. 4d. per joint.

Copper Statistics.—Messrs. H. R. Merton and Co.'s statistical circular of November 14 shows that English stock stands at 20,906 tons, practically the same amount as a month ago. European stocks give 35,965 tons, an estimated decrease of 601 tons compared with that at the end of October.

New Members of the B.E.A.M.A.—Messrs. Ashworth and Parker, Greenwood and Batley, Ltd., and Sandycroft, Ltd., have recently been elected members of the British Electrical and Allied Manufacturers' Association. The Harland Engineering Company has been elected an associate.

Mexican Tramways.—The London office of the Mexican Tramways Company has been notified that the Mexican Government has increased the wages of all the tramways employees by 25 per cent. and has also forbidden the remittance of further funds abroad until the rate of exchange improves. Urgent representations to the Mexican Government are being made in the matter.

East Ham Assessment.—By revision of the assessment of the tramways undertaking, a saving of £1,469 will accrue to the tramways department. The assessment has now been fixed at a net rateable value of £4,000. The change takes place as from April 1 last and will remain in force until September 30, 1915. A reduction has also been granted in the case of the West Ham Corporation tramways.

Aberdeen Suburban Tramways.—Baillie J. A. Smith has a motion before the Town Council for the purchase of the Aberdeen Suburban Tramways Company, and in the meantime consideration of the proposal to discontinue the agreement between the Town Council and the tramways company has been deferred. Mr. R. S. Pilcher, general manager of the Corporation tramways, has been directed to submit a report on the proposed purchase of the undertaking.

Central London Railway Electric Supply.—One of the clauses in the Metropolitan District Railway Company's Bill for the present session provides for a supply of electric energy for the Central London Railway from Chelsea generating station. It is anticipated that this will mean a considerable reduction in the working expenses, as it is understood that the works cost of the Chelsea station is much lower than the cost which the Central London Railway has hitherto incurred.

The Ailsa Oilskin and Rubber Company are much occupied at the moment with work necessarily delayed in carrying out some important Army orders. They are, however, working night and day. The company ask us to mention that they have considerably increased their staff and hope soon to overtake the work in hand. All orders are receiving careful attention systematically in their due order. The Ailsa Company feel sure that if customers understand the circumstances they will exercise a little patience at the present time.

Progress of the L.C.C. Tramways.—Horse traction on the London County Council tramways, which has been slowly diminishing for some time, has now almost disappeared. Early in August 4.07 miles of route were worked by horses, but a few days later, the conversion of a line to the electric system having been completed, the length worked by horses was reduced to 1.77 miles. The route length of electric tramways now amounts to 140.83 miles, so that, including the horse tramways, the Council has a total of 142.60 miles of route.

Sheffield and Military Requisitions.—Mr. W. J. Hadfield, surveyor of highways, Sheffield, in his annual report to the Highway and Sewerage Committee of the Corporation, says that within a few hours of the declaration of war the six motor lorries belonging to the Highways Department were requisitioned. These had been

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subsidised by the War Office from the date of their purchase, and the drivers had also been registered. A scale upon which the price for each lorry was to be fixed according to its age whenever the War Office might require it had been agreed upon; therefore no question has arisen as to compensation. Horses, harness, water barrels, and other stores were also requisitioned by various corps, and the total payment received, including the price of the motor lorries, was £4,272. At the time of writing the report an order had been given to Messrs. J. and E. Hall, Limited, of Dartford, Kent, for six lorries to replace the old ones, of which they were also the makers. As a temporary measure several second-hand motor chassis have been purchased for the purpose of drawing machine brushes, snow ploughs, etc., which cannot well be hauled by horses.

Police Ineptitude.—From an occurrence at West Ham it would appear that the Police Department has not yet grasped the fact that this country is at war and is involved in a struggle in which the fate of the Empire is at stake. To further Lord Kitchener's appeal for recruits Mr. Moffat, the general manager of the West Ham Corporation tramways, obtained special posters and in compliance with an official request exhibited them to the best advantage by placing them in some of the windows of the tramcars. The posters did not seriously impede the view, but they could not well be overlooked from inside or outside of the cars. Early in October the posters were changed, and this movement apparently drew the attention of a police officer whose zeal was not tempered by discretion; for another officer soon arrived from Scotland Yard and left instructions that the posters must be removed or the tramway cars would not be allowed on the streets. The reason alleged for this action was that the posters interfered with the passengers seeing their destinations. Correspondence followed, but Scotland Yard maintained its veto, and the posters have been removed. The judgment of the tramway manager as to what may or may not properly be displayed in the windows of the cars is a much safer guide than the hasty decision of a police officer, and it may be hoped that the last has not been heard of the matter.

RENEWALS AND SPARES FOR JOHANNESBURG TRAMWAYS.

The office of H.M. Trade Commissioner reports that tenders are invited by the Johannesburg Council for the supply of renewals and spares for tramcar motors, controllers, bogie trucks and brakes, also trolley and car fittings, etc. Copies of the specification and form of tender may be obtained from the office of the Controller of Stores, Municipal Offices, Johannesburg. Sealed tenders, on the proper forms, will be received by the Town Clerk, Municipal Offices, Plein Square, Johannesburg, up to noon on January 5, 1915. A copy of the specification and form of tender, together with a blue print, may be consulted by United Kingdom manufacturers of tramway material at the Commercial Intelligence Branch as above. It will be observed that the time for the receipt of tenders is limited, and owing to forms having to be obtained from South Africa this intimation will be of use only to firms having agents in the Union who can be instructed by cable.

PARLIAMENTARY.

Lincoln Corporation is promoting a Bill in the present session to provide for the use of railless vehicles and the erection of overhead equipment on certain routes within and outside the city and for working motor omnibuses; also to purchase land for the extension of the generating station.

Rotherham Corporation have deposited a Bill in the present session asking for powers to construct and work new tramways, and for compulsory running powers over the Sheffield Corporation lines; also for the use of motor omnibuses, etc.

The Bristol Tramways and Carriage Company propose to make application to Parliament in the present session with respect to the revival of powers and extension of time for the compulsory purchase of lands and for the completion of authorised tramways. The tramways in question are proposed extensions of some of the present routes into the country beyond the existing city boundaries. Opposition to the tramways purchase appears to be growing, and between 600 and 700 firms and individuals have now joined the general committee.

Bradford Tramways and Free Passes.—The question of free passes has recently been discussed by the Bradford Tramways Committee. According to the tramways manager passes to the value of £673 have been issued to various military and other agents since the outbreak of war. The Committee are anxious to continue what was undoubtedly a useful privilege, but they have been much concerned by various reports of abuses, and they have instructed the manager to report again at the next meeting, after having communicated with the authorities. The amount of £673 represents 107,800 journeys—the passes used include 90,700 by the military authorities, 7,050 by the Boy Scouts, 6,950 by the Lord Mayor's Fund visitors, and 3,100 by the Belgian Refugees' Committee for their use in connection with the refugees.

Plymouth Corporation Tramways.—In the Bill which is being promoted in this session by Plymouth Corporation power is sought by which the Corporation may work any tramways now or hereafter belonging to the Corporation and all other tramways in the borough, including those owned and worked by or leased to the Devonport and District Tramways Company, and the Plymouth, Stonehouse, and Devonport Tramways Company; also to exclude the last-mentioned from some or all the provisions of the Acts now relating thereto, and repeal those provisions with such exceptions as may be indicated in the Bill. The Corporation by the provisions of the bill would also be authorised to provide and run motor 'buses within the borough. Another point of general interest is the proposal to transfer to and vest in the Corporation the Cottonian Museum, now housed in Cornwall Street.

PERSONAL.

Mr. H. H. Gordon has resigned his membership of the L.C.C. Committee on London Electricity Supply.

Councillor Ernest Chitty has been re-elected chairman of the Dover Tramways Committee, and Councillor Barwick deputy-chairman.

Colonel Chas. William Trotter, of London, has been elected chairman of the Hull and Barnsley Railway Company, and Mr. J. H. Fisher, of Hull, vice-chairman.

CONTRACTS AND ORDERS.

Walsall Corporation has accepted the tender of Siemens Brothers Dynamo Works, Ltd., for the supply of "Tantalum" lamps for the tramways department.

Leicester Tramways and Electricity Committee have placed an order with the Wilson Rolling Shutter Company for three rolling steel shutters for the car repair depot, and with Messrs. A. L. Gibson and Co., of Twickenham, for twelve rolling steel shutters for the generating station extensions.

Glasgow Corporation have placed the following contracts for tramway stores:—Stewarts and Lloyds, street poles and c.i. pipe connections; B. J. and H. Cables, trolley feeder cable; W. Baird and Son, steel plates for manholes; P. and W. MacLellan, asphalt buckets; Titan Trackwork Co., E. Allen and Co. and Hadfields, Ltd., special trackwork.

FINANCIAL REPORTS AND MEETINGS.

Lancaster and District Tramways Company.—Receipts for the past year show a decrease of £1,027. The gross profits were £1,134, and after paying interest on loans, amounting to £831, there remains an adverse balance of £1,502.

Scarborough Central Tramways Company.—The directors' report for the year ended October 31st, 1914, mentioned that up to the end of July the season was very promising, but since the war commenced the receipts had fallen off very considerably. The directors recommended a dividend of 4s. per share, after payment of £100 in further reduction of the mortgage debentures, carrying forward a balance of £70 8s. 5d.

Dunlop Rubber Company.—A dividend of 15 per cent. on the ordinary shares for the financial half-year is recommended. The net profits of the company for the twelve months were £381,919 after providing for debenture interest and prior charges, and £37,679 was brought forward. An interim dividend at the rate of 10 per cent. per annum has been paid on the ordinary shares, and a further distribution at the rate of 20 per cent. per annum is proposed, making 15 per cent. for the year, writing £5,000 off goodwill, patents, etc., adding £175,000 to the reserve (raising that fund to £925,000) and carrying forward £33,241.

East India Tramways Company.—The Simplex petrol tramway cars by which the service of this company is provided continue to prove very satisfactory. In their report for the year ended July 31, 1914, the directors recommend the payment of a dividend of 5 per cent. on the cumulative preference and ordinary shares, and of 10 per cent. on the deferred shares. An interim dividend of 2½ per cent. was paid the preference and ordinary shares on May 31, 1914. This compares with a dividend of 5 per cent. a year ago. The following is a summary of the accounts:—

	1913-14.	1912-13.	Inc. or dec.
	£	£	£
Gross receipts	24,004	22,472	+ 1,532
Working expenses	15,142	12,758	+ 2,384
Net receipts	8,862	9,714	— 852
Reserve account	2,000	6,141	— 4,141
	6,862	3,573	+ 3,289
Brought forward from previous year	204	176	+ 28
Balance available for dividend	7,066	3,749	+ 3,317
Total amount of dividends paid	7,045	3,545	+ 3,500
Balance carried forward	21	204	— 183

The increase in expenses is accounted for by the increased cost of petrol and materials, increased wages, and by loss upon the running of road vehicles. The tramcar mileage amounted to 604,804 miles, and that of the road motor vehicles to 16,683. The number of passengers carried by tramcars was 5,904,037 and by road motor vehicles 140,272. The average earnings per passenger were .95d. The total running expenses of the tramcars were 4.12d., made up as follows:—Traffic expenses, drivers, inspectors, etc., .96d.; petrol and lubricating oil, 1.20d.; repairs and maintenance, 1.13d.; depreciation, .83d. The total running expenses of the motor road vehicles were 9.31d. Office expenses amounted to .79d.; permanent way expenses, .24d.; rent, rates and royalties, .10d.; making the total for the working expenses, 5.36d. The company has been authorised to make certain extensions, but owing to the war it is not deemed advisable to proceed with the construction at present.

Walthamstow Council Tramways.—The tramways manager, Mr. William Murray, in his report for the year ended March 31, says that although the loss of business experienced in 1912-13 was more than recovered, more passengers being carried and more money

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taken than ever before, the financial result was worse than in any other year in the history of the undertaking except the first, when there was a loss of £5,575. Last year the net loss amounted to £4,357. Interest, repayment of loans, maintenance of permanent way, upkeep of rolling stock and the cost of electrical energy have all been higher than the previous year. To the loss has been added the sum of £3,378, the cost of superseded work. Mr. Murray urges that the whole of the tramway-owning authorities in Greater London should unite in a determined and persistent agitation that the burden of road maintenance should be equally borne by competitive undertakings. Pressure should also be exercised for the making of regulations requiring all slow moving traffic to keep to the sides of the road. Regulations of this kind have been enforced elsewhere, and have met with marked success. Mr. Murray says that he sees no reason why they should not be adopted in the Metropolitan area also. The traffic revenue amounted to £38,589, as against £37,191 in 1912-13, an increase of £1,398. Considering that during four of the best months of the year the whole service was more or less upset by the alterations being made to the permanent way, the result is regarded as very satisfactory. The average receipts per car mile were 7.94d., as against 7.76d. The number of passengers, which was 12,579,852, shows an increase of 772,303. The energy consumption for traction purposes was 1,406,462 units, an increase of 69,422 units over the previous twelve months, and the amount paid for it to the Electricity Department was £8,567, as against £8,175 in 1913. The energy consumption per car mile amounted to 1.28 units. The capital account stands at £188,192, and the total track length is 13.5 miles. The rolling stock now totals 38 cars.

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 57 of the principal undertakings of the United Kingdom for the week ended November 21 give total receipts of £200,453, or £6,637 less than in the corresponding week last year. The total length of track was 2,630 miles, or 24 more than for the corresponding week. The receipts this year were at the rate of £76 4s. 4d. per mile of track, and last year at the rate of £79 9s. 4d., thus giving a decrease for the past week of £3 5s. per mile open.

Coal Market.—Owing to the difficulties of navigation and scarcity of supplies in consequence of the demand of the Allied Admiralties, quotations can now be given only at time of actual delivery.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return. 1912-3.	Latest Return. 1913-4.	Aggregate Wks.	Aggregate 1913-4.	Increase or Dec.
Anglo-Argentine	Nov. 18	£51,517	£52,459	46	£2,486,739	— £66,071
Auckland..... (28 days)	Oct. 28	20,204	19,777	16½	85,127	+ 3,370
Ballarat and Bendigo	Aug. 16	3,166	3,055	20	17,282	— 248
Brazilian St. Rly. Mlrs	May	44,820	50,237	43	523,872	+ 76,626
Brazilian Trctn. Mlrs.	Sept.	6,028,078	6,096,940	39	15,170,088	+ 1,316,273
Brisbane	October	27,250	28,763	43	288,621	+ 28,603
British Columbia .....$	Sept.	734,283	650,516	13	2,015,851	— 245 503
Buenos Aires Pt. & City	June	6,791	6,738	23	43,250	+ 3,146
Buenos Aires Lacrosse..	July	45,221	43,327	4	43,327	-- 1,894
Calcutta.....Rs.	Nov. 21	67,754	60,822	46	30,88,319	+ 50,729
Cape Town	June	11,560	12,742	52	155,466	+ 18,243
Carthagena & Herreria:	October	1,592	1,548	43	22,688	— 3,555
Cordoba	Sept.	13,348	12,384	26	82,058	+ 1,333
East India	October	1,978	2,007	13	6,099	+ 188
Kalgoorlie	Sept.	3,068	2,864	39	23,980	— 2,467
La Plata	Sept.	4,528	4,190	39	41,852	— 3,659
Lima	August	33,939	29,800	35	271,607	+ 5,102
Lisbon ..... Mlrs.	July	184,715	171,179	31	1,143,064	+ 45,838
Madras (14 days) Rs.	Oct. 15	26,161	24,042	41	5,41,291	+ 30,947
Manila .....$	October	148,000	125,750	43	1,341,070	— 48,025
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	June	56,500	60,500	29	387 500	+ 7,000
Mexico .....$	Sept.	604,744	667,421	39	5,513,765	+ 397,434
Montevideo	Sept.	27,870	25,227	47	884,945	— 9 836
Port Elizabeth	June	3,288	3,212	52	44,931	+ 1,901
Puebla ..... $	Sept.	51,100	52 200	39	534,500	+ 18,800
Rangoon	October	5 963	4,600	48	50,657	— 942
Shanghai .....$	Oct. 21	25,147	24,925	...	...	...
Singapore .....$	Oct. 17	18 071	9,851	42	478,196	— 24,700
Toronto .....$	Sept.	865,796	879,321	39	7,622,107	+ 438,637
Winnipeg.....$	Sept.	331,782	310,996	39	3 071,940	+ 90.506

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TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return. 1913.	Latest Return. 1914.	Latest Return. Incr. or Dec.	Aggregate. Wks	Aggregate. 1913-4.	Aggregate. Increase or Dec.
Aberdeen Corporation..	Nov. 18	£1,472	£1,471	— £1	25	£42,236	+ £690
Accrington Corp.....	,, 11	563	477	— 86	32	17,866	— 853
Ayr Corporation	,, 21	239	206	— 33	27	11,045	— 858
Bath Electric	,, 18	775	741	— 34	46	44,580	+ 74
Birkenhead Corp.	,, 22	1,225	1,115	— 110	33½	42,751	— 1,884
Birmingham Corp.	,, 21	12,296	11,591	— 705	34	410,356	+ 11,429
Blackburn Corporation	,, 18	1,169	1,017	— 152	34	44,903	— 858
Blackpool Corporation	,, 19	504	528	+ 19	34	63,547	— 9,914
Bolton Corporation	,, 22	2,603	2,328	— 275	34	98,188	— 406
Bournemouth Corp.....	,, 26	1,658	1 577	— 81	34	71,418	— 4.001
Bradford Corporation..	,, 21	5 589	5,430	— 159	34	213,082	+ 8,986
Brighton Corporation..	,, 22	893	766	— 127	33½	80,366	— 377
Bristol	,, 20	7,275	7,645	+ 370	46½	307,844	+ 22,453
British Elec. Federatn.	*	...	...	...	...	...	...
Burnley Corporation ..	Nov. 21	1,579	1,255	— 324	34	52,948	— 5,592
Burton-on-Trent Corp.	,, 22	269	245	— 24	34	10,218	+ 245
Bury Corporation.....	,, 22	1,255	1,100	— 155	33½	45,977	+ 535
Cardiff Corporation.....	,, 14	2,642	2,441	— 201	32	91,855	+ 723
Chatham and District..	,, 19	848	908	+ 60	46	44,564	+ 1,458
Chesterfield Corp.	,, 19	259	235	— 24	33	8,747	+ 333
Colne Corporation	,, 21	242	178	— 69	...	...	...
Cork Electric.....	,, 19	456	444	— 12	46	23,190	— 91
Croydon Corporation ..	,, 13	1,570	1,584	+ 14	32	56,914	+ 2,137
Darlington Corporation	,, 21	246	234	— 12	34	9,014	+ 487
Derby Corporation	,, 21	929	904	— 25	33½	34,582	+ 741
Dover Corporation	,, 21	197	201	+ 4	34	8,857	— 55
Dublin & Lucan	,, 20	110	112	+ 2	20½	3,080	— 24
Dublin United	,, 20	4.722	5,368	+ 646	46	272,123	+ 17,290
Dundee City	,, 18	1,261	1,178	— 83	26½	34,890	— 580
East Ham Corporation	,, 21	991	1,144	+ 153	33½	38,696	+ 5,198
Exeter Corporation.....	,, 20	292	283	— 9	34	12,247	+ 205
Gearless Motor 'Buses.	*	...	...	...	...	...	...
Glasgow Corporation ..	Nov. 21	20,361	18,891	— 1,470	24	504,361	+ 1,475
Glossop (U. Elec. Supply)	,, 21	118	89	— 29	47	5,699	— 395
Halifax Corporation ..	,, 17	1,865	1,841	— 24	33	74,782	+ 2,872
Hastings & District.....	,, 18	766	722	— 44	47	47.395	— 2,738
Huddersfield Corp.....	,, 21	2,007	2,187	+ 180	34	100,154	+ 7,921
Hull Corporation.....	,, 21	3,163	2,897	— 266	34	105,667	— 1,148
Ilford U.D.C.	,, 21	429	556	+ 127	33	19,228	+ 3,855
Ilkeston Corporation ..	,, 25	125	107	— 18	34	4,487	— 208
Ipswich Corporation ..	,, 21	393	346	— 47	34	15,992	— 260
Isle of Thanet	,, 21	332	258	— 74	7	2,786	— 416
Kilmarnock Corp.	,, 21	162	136	— 26	27	4,467	— 390
Lanarkshire	,, 19	1,707	1,622	— 85	46	86,533	+ 7,343
Lancashire United	,, 18	1,557	1,415	— 142	46	75,590	+ 3,634
Leeds City	,, 21	7,956	7,436	— 520	34	281,106	+ 223
Leicester Corporation..	,, 20	2,775	2,728	— 47	47	133,456	+ 2,344
Leith Corporation	,, 21	637	613	— 24	27	19,984	+ 237
Leyton U.D.C.	,, 19	1,391	1,381	+ 30	32	45,699	+ 2,041
Liverpool Corporation.	,, 21	12,719	11,704	— 1,015	46½	610,943	+ 8,985
Llandudno & Colwyn B.	,, 20	156	148	— 8	51	15 473	— 2,045
London County Council	,, 18	42,565	45,130	+ 2,565	33	1,469,568	+ 69,082
London Gnl. Omnibus..	*	...	...	...	...	...	...
London United	*	...	...	...	...	...	...
Lowestoft Corporation	Nov. 21	194	161	— 33	7	1,369	— 188
Maidstone Corporation	,, 19	196	159	— 37	34	7 353	+ 180
Manchester Corp.....	,, 21	17.344	15,504	— 1,840	34	587,420	— 9,006
Met. Elec. Trys.	*	...	...	...	...	...	...
Nat. Steam Car Co., Ld.	Nov. 21	3,688	3,229	— 459	3	11,012	+ 165
Nelson Corporation.....	,, 21	179	128	— 51	33½	6,446	— 789
N'castle-on-Tyne Corp.	,, 21	4,994	5,364	+ 370	34	194,650	+ 18,721
Newport (Mon.) Corp...	,, 21	766	685	— 81	34	23,037	+ 1,765
New St. Helens & Dist..	,, 18	741	806	+ 65	20	19,595	+ 1,585
Northampton Corp	,, 20	540	592	+ 52	33½	20,154	+ 965
Nottingham Corp.	,, 19	3,818	3,124	— 194	33½	114,787	+ 1,308
Oldham Corporation ..	,, 22	2,181	1,836	— 345	35	77,181	— 557
Portsmouth Corp.....	,, 21	1,893	1,857	— 36	34	84,044	...
Preston Corporation ..	,, 18	856	809	— 47	34	31,281	+ 910
Provincial	,, 21	1,604	1,792	+ 188	7½	14,797	+ 1,790
Reading Corporation ...	,, 19	643	610	— 33	33	23,975	+ 374
Rhondda.....	,, 19	1,206	1,097	— 109	46	56,912	+ 1,092
Rochdale Corporation	,, 21	1,486	1,350	— 136	34	55,674	+ 371
Rotherham Corp.....	,, 25	1.011	918	— 93	34	35,470	+ 984
Salford Corporation ..	,, 28	5,614	4,350	— 1,264	33	170,776	— 7,966
Sheffield Corporation..	,, 22	7,600	7,281	— 319	34½	297,255	+ 6,733
Southampton Corp.....	,, 18	1,206	1,098	— 108	33	45,275	— 178
Southend-on-Sea Corp.	,, 18	700	615	— 85	34	36,851	+ 2,272
South Met. Trys.	*	...	...	...	...	...	...
South Shields Corp.....	Nov. 21	676	631	— 43	33½	26,219	+ 1,603
Sunderland Corp.....	,, 22	1,370	1,317	— 53	34	50,663	+ 855
Sunderland District ..	,, 18	584	452	— 82	8	1,499	— 114
Swindon Corporation ..	,, 18	153	158	+ 5	33	6,053	+ 417
Torquay.....	,, 19	385	331	— 54	46	26,122	— 3,643
Trys. (M.E.T.) 'Buses	*	...	...	...	...	...	...
TynesideTrys. & Tmrds	Nov. 18	466	489	+ 23	21	13,046	+ 1,973
Wallasey Corporation	,, 21	1,079	974	— 105	33½	48 738	+ 1,843
Walsall Corporation ...	,, 21	633	614	— 19	47	29,405	+ 143
Walthamstow U.D.C....	,, 21	696	687	— 9	34	23,056	+ 2,516
Warrington Corp.....	Oct. 29	442	415	— 27	30	11,842	— 334
West Ham Corporation	Nov. 19	2,668	2 690	+ 22	33	95,014	+ 3,487
Wigan Corporation.....	,, 19	1,496	1,310	— 184	33	48,856	— 1,222
Wolverhampton Corp	,, 25	1,041	920	— 121	35	36,383	— 1,137
Yorkshire (W. Riding)	,, 22	1,393	1,278	— 115	47	68,219	— 2

* Issue of Traffic Returns suspended during the War.

Telegrams: KRANKASES. Telephones: {4879 CENTRAL. 3846 CITY.

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THE

Tramway & Railway World

Vol. XXXVI. No. 23.] LONDON, SATURDAY, DECEMBER 5, 1914. [Established in 1892.

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Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

GREAT NORTHERN RAILWAY COMPANY (IRELAND).

TO ELECTRICAL CONTRACTORS.

The Directors are prepared to receive tenders for the supply of Electrical Plant and Materials at their Dundalk Works, as under :—

Electric Motors and Accessories.
Sub-Station Switchboard.
Hard Drawn Copper Wire.
Bitumen Wires.

Drawings, specifications, and form of tender can be obtained from the undersigned on payment of one guinea, which will be refunded on receipt of a *bona-fide* tender and the return of the drawings.

Tenders made out on the forms supplied by the company should be delivered under sealed cover, endorsed "Tender for Electrical Plant, Dundalk," to the undersigned not later than 10 a.m. on Monday, December 21, 1914.

The Directors do not bind themselves to accept the lowest or any tender.

T. MORRISON,
Secretary.

Secretary's Office,
Amiens Street Terminus, Dublin,
November 30, 1914.

CITY OF MANCHESTER.

The Electricity Committee of the Manchester Corporation are prepared to receive tenders for the supply, delivery, and erection at their Stuart Street Generating Station, of Three Reactance Coils.

Specifications and forms of tender may be obtained on application to Mr. F. E. Hughes, Secretary, Electrical Department, Town Hall, Manchester.

Further particulars and information can be obtained on application to Mr. S. L. Pearce, Chief Electrical Engineer, Dickinson Street, Manchester.

Tenders, duly endorsed and addressed to the Chairman of the Electricity Committee, must be delivered at the Town Hall, not later than 10 a.m. on Monday, the 21st instant.

The Corporation do not bind themselves to accept the lowest or any tender.

THOMAS HUDSON,
Town Clerk.

Town Hall, Manchester,
December 1, 1914.

DUBLIN UNITED TRAMWAYS COMPANY.

The Dublin United Tramways Company is prepared to receive tenders for the supply of 250 to 500 Tons Steel Tramway Rails.

Full particulars on application to :—

R. S. TRESILIAN,
Secretary,
9, Upper Sackville Street, Dublin.

December 2, 1914.

BOROUGH OF HORNSEY.

The Town Council invite tenders for the supply, delivery, and complete erection of Extra-high Tension Switchgear, and also for the supply and delivery of Extra High Tension Three-core Cable.

Forms of tender may, after 10s. 6d. has been deposited with the Borough Treasurer in respect of each or either of the above tenders (to be refunded to *bona-fide* tenderers after tenders have been considered), be obtained of the Borough Electrical Engineer, at the Electricity Works, Tottenham Lane, Hornsey, N.

Tenders, endorsed "Tenders for E.H.T. Switchgear" or "Tenders for E.H.T. 3-Core Cable," to be delivered or sent by post, so as to be received in the Town Clerk's office by 12 (noon) on Tuesday, the 29th inst.

The Council reserve to themselves the right to decline all, or any, or any portion of any, of the tenders sent in.

F. D. ASKEY,
Town Clerk.

Town Clerk's Office, Town Hall,
99, Southwood Lane, Highgate, N.,
December 1, 1914.

BOROUGH OF NEWCASTLE-UNDER-LYME.

ELECTRICITY DEPARTMENT.

Tenders are invited for the supply, delivery, and laying complete of about 600 Yards of 3-Wire Single Low Tension Vulcanised Bitumen Distributors.

Copies of specification and full particulars may be obtained from the undersigned on payment of a deposit of one guinea, which will be returned on receipt of a *bona-fide* tender. Extra copies of the specification may be had on payment of 2s. 6d., which will not be returned.

Tenders, endorsed "Tender for Cables," and addressed to the Town Clerk, Newcastle, Staffs., to be delivered not later than Monday, December 14, 1914.

The Council does not bind itself to accept any tender.

ALFRED J. C. DE RENZI,
Borough Electrical Engineer.

WALTHAMSTOW URBAN DISTRICT COUNCIL.

ELECTRICITY DEPARTMENT.

The Council invite tenders for the supply, delivery, and erection of the undermentioned plant :—

Contract No. 28.—1,500 kw. Turbo Alternator.
,, No. 29.—600 kw. Triple Expansion Engine and Dynamo.
,, No. 30.—1,000 kw. Rotary or Motor Converter.

Tenderers are at liberty to tender for the whole of the sections or for any section, but not for part of any section.

Copies of the general conditions, specifications, forms of tender and drawings can be obtained from Mr. G. R. Spurr, Electrical and Tramways Engineer, Priory Avenue, Walthamstow, on depositing the sum of two pounds (£2), which amount will be refunded on receipt of a *bona-fide* tender, and to the successful tenderer on completion of the contract.

Additional copies of the specifications, etc., may be had on payment of ten shillings for each copy, which amount will not be returnable.

Sealed tenders, on the prescribed forms, endorsed "Tender for Electrical Plant," must be delivered BY POST ONLY to the undersigned not later than 5 o'clock on Wednesday, December 23, 1914.

The Council do not bind themselves to accept the lowest or any tender.

The contractor will be required to pay the whole of the workmen such rates of wages, and observe such hours of labour as are recognised by the various Trade Unions, and in force at the time of signing the contract.

C. SYDNEY WATSON,
Clerk to the Council.

Town Hall, Walthamstow,
December 1, 1914.

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POSITIONS VACANT.

COUNTY BOROUGH OF BOLTON.

ELECTRICITY DEPARTMENT.

Applications are invited from suitable men for the following temporary positions :—

One Charge Engineer at 50s. per week.
Two Junior Engineers at 30s. per week.
Four Switchboard Attendants at 25s. per week.

Applicants must have had previous experience in three-phase and d.c. work, and must be men not eligible for service with H.M. Forces.

Applications, stating age and qualifications, and enclosing copies of not more than three recent testimonials, to be forwarded to Mr. W. J. H. WOOD, Borough Electrical Engineer, Electricity Works, Spa Road, Bolton.

COUNTY BOROUGH OF CROYDON.

CHIEF ASSISTANT ELECTRICAL ENGINEER.

The Corporation of Croydon invite applications for the appointment of Chief Assistant Electrical Engineer, from gentlemen not less than 25 years of age.

The salary will be at the rate of £250 per annum, rising by annual increments of £25 to a maximum of £350 per annum, and will be subject to an annual percentage deduction in accordance with the provisions of the superannuation scheme adopted under the Croydon Corporation Act, 1893.

Applicants should be competent mechanical and electrical engineers with the proper technical training, and have had experience in central station work.

The gentleman appointed will be required to devote the whole of his time to the duties of the office.

Applications (in candidate's handwriting), to be made upon forms which will be supplied from the Town Clerk's Office on receipt of a stamped, addressed, foolscap envelope, must be sent to me with copies (not originals) of not more than three testimonials of recent date not later than 11 o'clock on the forenoon of Thursday, December 17, 1914, endorsed "Chief Assistant Electrical Engineer."

Canvassing will disqualify applicants.

Dated this 30th day of November, 1914.

JOHN M. NEWNHAM,
Town Clerk.

Town Hall, Croydon.

LANCASHIRE ELECTRIC POWER COMPANY.

ENGINEER-ON-WATCH.

The above Company have a vacancy for an Engineer-on-Watch at their main Power Station. Salary, £13 per month.

Applications should be sent to the undersigned as soon as possible, and should arrive not later than Wednesday morning, the 9th instant.

M. H. ADAMS, A.M.I.Mech.E.,
Resident Engineer.

Power Station, Radcliffe, Lancs.

THE PROPRIETORS OF THE PATENTS Nos. 25012 of 1910 for "Improvements in or relating to Collectors for Overhead Conductor Electric Traction Systems"; 27798 of 1910 for "Improvements in or relating to Collectors for Electric Traction on the Overhead Conductor System"; 3747 of 1911 for "Improvements in Supports for Electric Conductors or Railless Track Systems"; 4397 of 1911 for "Improvements relating to Overhead Electric Trolley Wire Construction," are desirous of entering into arrangements by way of license and otherwise on reasonable terms for the purpose of exploiting the same and ensuring their full development and practical working in this country. All communications to HASELTINE, LAKE AND CO., Chartered Patent Agents and Consulting Engineers, 28, Southampton Buildings, Chancery Lane, London, W.C.

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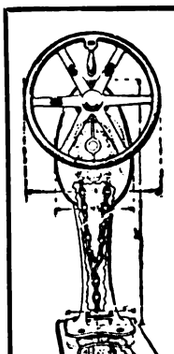

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THE
Tramway AND Railway World

Established in 1892 and Published by

THE TRAMWAY & RAILWAY WORLD PUBLISHING CO., Ltd.,
AMBERLEY HOUSE, NORFOLK STREET, LONDON, W.C.

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FOR ALL PLACES ABROAD—Thirty Shillings per Annum.

SATURDAY, DECEMBER 5, 1914.

CUTTING DOWN CAR DELAYS.

A recent innovation in Manchester is a car with entrances at both sides of the platforms. The object of the arrangement is, of course, to minimise delays at termini, and we shall be surprised if the design does not now rapidly become popular. The idea is not new. Attention was drawn in these columns to the desirability of the improvement so long ago as 1906, when in our issue of April 5 of that year a car built in this way for the Santiago tramways was described. From time to time since then we have frequently urged the advantages to be obtained from the design; but up to the present, with the exception of experiments with single cars at Huddersfield and Aberdeen, nothing has been done. Now that Mr. McElroy, the general manager of Manchester tramways, has led the way with a fresh experiment, it may be hoped that more attention will be given to the unmistakable advantages which this comparatively simple change will confer on the managers and users of tramways. The Board of Trade for many years discouraged the use of entrances at both sides of the cars, because it seems to have been thought that their use would increase the danger of passengers in alighting at the front end of the car; though why this should be the case it is difficult to understand. Further study of the matter has, however, encouraged the Board to look upon the arrangement with greater favour, and it is gratifying to learn that they have approved of the car now in service at Manchester. This car has been working for over two months, and it has, we gather, proved that the benefits expected can be fully realised. Clearly, the speed with which a car can be emptied and filled where passengers leave at one end of the car and enter at the other must be greatly increased, as compared with the common practice when all passengers have to leave before those wishing to enter can do so. The waste of time entailed by the present arrangement is irritating to a busy man, and the delay to the cars is in the aggregate a serious loss to the undertaking. Every moment, in fact, that a car stands idle represents an appreciable loss in earning power; consequently every effort to cut out this waste ought to be made. From the point of view of safety the new car at Manchester should also prove a boon to the public, and thus indirectly to the tramway undertaking. The longer people stand in the roadway waiting to enter a car the greater is the danger of their being run down by road vehicles. This danger has been increased tenfold in these days of increasing motor traffic, as the records of coroners' courts show; and everything that reduces the time during which tramway passengers stand in the roadway will diminish the hazard which they run. If they are instructed when alighting at the front end of the car always to face towards the rear, so that they meet the general stream of traffic, accidents due to running down should be entirely avoided. It has been said that the double entrance was impracticable in cars with upper decks, but the Manchester car has upper decks and stairways, and yet it has been found possible to provide the small entrance to the near side of the platform without in any other way interfering with the usual design of the car. Managers who have not observed the working of a car with double entrances would, we think, find a visit to Manchester for the purpose by no means a waste of time.

THE SHORTAGE OF AUTOMOBILE PARTS.

The difficulties which now confront the automobile industry through their past reliance on the Continent for much of the materials of which their cars are constructed are enhanced by the fact that all the big steel makers in this country are inundated with orders for war material which naturally must take precedence over all others. The automobile engineer must, however, obtain steel castings, forgings, stampings and other accessories in order to be able to carry on his business at all, and he is therefore obliged to look for some new source of supply. What this source shall be is the immediate difficulty which the Institution of Automobile Engineers is making every endeavour to discover. The first step was the reading of a paper by Mr. L. H. Pomeroy, of the Vauxhall Motor Company, in London, on October 14, but this paper, though it evoked a great amount of interest in the subject, did not provide a solution. Mr. Pomeroy has now been deputed by the Council to make another attempt in the Midlands, and he will read a second paper on similar lines in Birmingham during the present month.

A large number of firms connected with the steel industry who are already interested in this particular branch of the subject, or who might become interested, have been invited by the Council to be present at the meeting in order that they may hear the views of the automobile engineer and put forward their own criticisms or suggestions. It is hoped that a large gathering of automobile manufacturers will also be present, so that the whole subject may be thoroughly thrashed out from the two points of view. It is quite recognised that no final solution of the difficulty may be arrived at by such a discussion, useful though it is bound to be, and the question may require consideration by a committee consisting of representatives of both sides. Whatever the outcome may be, there is no doubt about the urgency of the matter at the present time, and the Council would impress upon all those who are interested in steel castings, stampings or forgings, or other accessories of the motor car, either from the seller's or the buyer's point of view, to do their utmost to be present at the meeting in order that the matter may receive the attention which it deserves. Full particulars of the meeting and copies of the paper may be obtained on application to the Secretary of the Institution of Automobile Engineers, 28, Victoria Street, Westminster, London, S.W.

TRAMWAY BILLS FOR 1915.

LONDON COUNTY COUNCIL.—The official notice has been issued of the Bill which the London County Council are promoting in Parliament for the construction of tramways and the widening of streets. The new lines are proposed to run from Charles Street to Charterhouse Street, from Aldgate to near Mark Lane, from Crouch Hill to Seven Sisters Road, from Mare Street to Terrace Road, and from Church Crescent and Shoreditch High Street to Cambridge Road. Some of these lines have been proposed in previous sessions, but were not sanctioned. It is also sought to obtain authority to run coupled and trailer cars on the north side of the Thames. This authority already exists in regard to the lines south of the river.

DUNFERMLINE.—A notice has been given that an application will be made for a Provisional Order to authorise the construction of a tramway between Dunfermline and Rossyth dockyard. It is also proposed to link up Inverkeithing and the Forth Bridge district with the West Fife tramway system.

EDINBURGH CORPORATION.—The Town Council of Edinburgh are applying for a Provisional Order to enable them to construct tramways and a tramroad, principally in the Colinton and Corstorphine districts. Various short junction lines are also proposed.

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FUTURE OF THE EDINBURGH TRAMWAYS.

The Tramways Committee of the Edinburgh Town Council on December 1 considered a report as to the desirability of approaching the Edinburgh and District Tramways Company with the object of ascertaining on what terms they would be prepared to at once terminate their lease, which expires in June, 1919. A letter was read from the manager of the company, stating the terms on which the Company were prepared to hand over their undertaking to the Corporation. They valued the undertaking at £202,000, but they were willing to hand it to the Corporation for £150,000. Taking into consideration the question of profits for the remaining years of the lease, directors' fees, the condition of the rolling stock, etc., they stated that they could not go below this figure. After discussion, the committee agreed that the company's offer could not be entertained, and it was decided to take no further steps in the matter.

The committee also considered a motion by Councillors Deas and Graham to remit to the Tramway Committee to consider the existing position of affairs and the present and prospective needs of the city with regard to tramways, and in particular with regard to the taking over and working by the Corporation of the existing tramways, additional routes and extension desirable now and in the near future, the method of traction to be used, having in view the amenity of the city, the existing system and the desirability of through working with Leith, and the extended use, or otherwise, of motor omnibuses in connection with the transport service of the city. There was also a motion to consider and report as to the expediency of providing tramways to Queensferry in view of the increased and rapidly-growing inter-communication between Queensferry and the development of Rosyth. The committee agreed to remit both matters to the burgh engineer to draw up a report containing suggestions, and at the same time to make experiments with self-propelled cars.

FREE PASSES FOR EMPLOYEES.

We have received from Mr. T. B. Goodyer, general manager of Croydon Corporation tramways, the following summary of information he has obtained from 92 tramway undertakings respecting free passes issued to employees for use when off duty :—

Systems allowing employees to travel free—to and from duty only	*b* 70
Systems allowing employees to travel free to and from duty, and with restrictions, when off duty	65
Systems allowing employees to travel free at all times	*d* 7
Systems not allowing free travelling at all	1
Systems not allowing free travelling off duty	80
Systems having received a request for free travelling facilities —on and off duty	11
Systems not having received such a request	81

b In the great majority of cases this refers to Uniform employees only.
c Including one Metropolitan company system.
d Including two Metropolitan company systems.

A request was recently made by the Croydon tramwaymen that "free passes should be issued to all employees." The Tramways Committee, after considering the general manager's report upon the matter, resolved that the application be not acceded to.

L.C.C. TRAMWAY MATTERS.

At the meeting of the London County Council on Tuesday the Highways Committee reported that they had appointed Mr. William Haydon a representative of the Council on the Traffic Conciliation Board in the place of Major A. C. H. Kennard, who is on service with His Majesty's forces, and has found it necessary to resign his membership on the Traffic Conciliation Board.

PIPING AT GREENWICH STATION.

On the recommendation of the Highways Committee, payment was authorised to J. Cochrane and Sons, Limited, of one half of the money retained by the Council in connection with their contract for the laying of condensing water pipes in the bed of the river Thames at the Greenwich generating station. The tender of the firm was accepted in the summer of 1913. With a view to giving greater security to the basement of the station, thereby minimising the risk of an accident, arrangements were recently made for the height of the shaft in which the new condenser pipes are placed to be raised. This work is being carried out at a cost not exceeding £1,000 by Messrs. Cochrane and Sons, as an extension of the contract for the laying of condensing water pipes. The work included in the original contract was almost completed in September last, but owing to the difficulty of obtaining material the extra work will probably occupy two or three months beyond the original contract time. Under the terms of the contract this money would not be payable to the company until the whole of the work had been completed.

In connection with the contract with the Brightside Foundry and Engineering Company, Limited, for the supply of steam, exhaust, condenser, feed, etc., piping for the Greenwich generating station, the Highways Committee recommended that payments on account be made to the company, for a further period not exceeding two months, of 75 per cent. of the value of the work delivered and erected, and 50 per cent. of the value of the work delivered only.

TRAMWAYS IN EAST HILL, WANDSWORTH.

On July 7 the Council approved an estimate of £26,000 for the construction of tramways from the present terminus in East Hill, Wandsworth, to Garratt Lane. It is proposed to proceed first with the construction of the tramways as far westward as a point near Fairfield Street. Pending the completion of the whole route to Garratt Lane it will be necessary to instal a cross-over for reversing the cars near Fairfield Street. The cost of this work is estimated at £600, provision for which was not included in the original estimate, and the Committee recommended that the estimate should be increased to £26,600, so as to include the cost of the cross-over.

All the tramway reports were adopted.

RETURN FARES.

Mr. J. D. Gilbert asked the chairman of the Highways Committee whether his Committee had further considered the question of instituting return tickets for penny stages, and when a report was likely to be presented to the Council on the subject.

Mr. G. H. Hume replied that the chief officer of tramways had been instructed to report on the question of additional return fares, with special reference to the penny stages, but perhaps it was too early to say when a report would be made on the subject.

A HEROIC PIERMASTER.

Mr. A. L. C. Fell, the chief officer of tramways, presented Piermaster T. H. Woodruff to the Council, he having been awarded the bronze medal of the Royal Humane Society for saving life from drowning.

The Chairman (Lord Peel) congratulated the piermaster, who was loudly cheered, and mentioned that the officer, of whom the Council was proud, had saved no fewer than 36 lives from drowning. Having pinned the medal on the piermaster's coat,

Mr. Woodruff thanked the Council for his reception, and said he had only done his duty.

MISCELLANEOUS NEWS AND NOTES.

No Christmas Day Cars in Newport.—The Newport Electricity and Tramways Committee have decided that no cars will be run on Christmas Day.

An Improvement in Manchester.—The Improvements Committee of Manchester Corporation tramways have approved a re-arrangement of the tracks in Albert Square, so as to bring them nearer to the centre of the square, and to allow the erection of a refuge and shelter for tramway passengers.

The State of Employment.—In spite of the forebodings as to the effect which the war might have on employment in this country, the returns issued periodically by the Board of Trade are of an encouraging nature. Recent figures show that in the trades compulsorily insured against unemployment—namely, building, works of construction, engineering, shipbuilding, vehicle making, etc.—the percentage of unemployment is not increasing.

Feed Water Regulation.—Messrs. Scholey and Company, of 151, Queen Victoria Street, E.C., have sent to us a copy of a pamphlet dealing with Cope's feed water regulator which they are just putting on the British market and for which they have acquired the rights for this country and the Colonies. The main feature of the regulator is that it takes into consideration the variations in loads. With this instrument a continuous feed can be given with a varying level which, of course, is of importance at a time of heavy overload, when it is necessary that the boiler furnaces should be used for generating the excess steam instead of being utilised to heat cold feed water.

Car Overturned at Barnsley.—A tramcar descending a very steep gradient in Eldon Street North, Barnsley, on December 2, broke away, and after travelling about 500 yards, left the track at a curve, ran across the road for about 20 yards and crashed into a shop, breaking the front of the building. Six women and one child were severely injured. The car arrived at Eldon Street terminus about 4.30 p.m., and the driver, after bringing it to a standstill, it is stated, by applying his brake, had occasion to leave the platform. During his absence the car began to move, and soon gathered speed down the steep incline. The conductor, failing to succeed in his efforts to stop the car, jumped off with a number of other passengers before the crash.

Dover Tramways.—Councillor Ernest Chitty, in expressing his thanks for re-election to the chairmanship of the Tramways Committee, said that although the financial results now were not all they could desire, they looked to the future with more confidence. They were re-laying the track, and in another twelve months it would be in very good condition, and then it would be unnecessary to spend so much on the upkeep of the track, and the maintenance of the cars, which had suffered badly from the state of the track, would be less expensive. The real trouble with the system was the excessive price they had to pay for current, but the electricity department was doing better, and they hoped that the cost of current would soon be reduced.

Serious Accident at Devonport.—On November 27 a car on the Devonport and District tramway system overturned at the bottom of an incline and two passengers were killed and over 30 injured. The scene of the accident was a curve at the foot of a gradient leading from St. Michael's Terrace to the Technical Schools, and the car was used for conveying workmen. It appears from various statements that the car got out of control while descending the hill, and was running at such a speed that when it reached the bottom it left the rails when rounding a curve and overturned. A similar accident occurred at the same place several years ago. Since that time the tramway company obtained land which enabled them to widen the road, and the curve was made less sharp and the outer rail was given more super-elevation. Recently the track was re-laid with new rails. The cause of the accident may be elucidated at the coroner's inquest, which has been adjourned till next Monday.

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Tramways and the War.—The responsible officials who have the organisation of the T.O.T. (Train, Omnibus, Tramcar) Mutual Aid Fund have arranged a number of entertainments by which they hope to obtain further support for the dependents of the employees of the company who are now at the front.

Melbourne Tramways.—The concession of the Melbourne Tramways Company expires in 1916, when the cable tramways in the city will come under some form of municipal control. The undertaking has been a very profitable one for the company. Its paid-up capital is £170,000, and the dividends paid to the shareholders during the thirty years of the concession have aggregated £2,000,000. The company has also a large reserve fund in the shape of its plant and rolling stock, which must be taken over by the Corporation. No decision has yet been reached as to the course which the Government will adopt, although it is anticipated that a public trust will be formed to take over the control of the tramways, which extend to various outlying districts.

Depot Extension at Brighton.—At a meeting of Brighton Town Council on November 26 Alderman Griffith, in moving the adoption of the report of the Tramways Committee, said that there was an absolute necessity for an extension of the sheds in which the tramcars stood. For many years past they had had to keep two cars always standing in the open, and that was very unsatisfactory. Now they had three new cars completed they thought it would be a pity to stand them in the open. The proposed extension provided room for six cars. The whole of the money could be raised out of capital, and it was proposed that the money should be so raised. When the trackless trolley service came into operation it would be necessary to have a separate depôt. The proposal was agreed to.

Children's Tickets at West Ham.—Arrangements have been arrived at with the other tramway authorities having through-running agreements with West Ham, under which children's tickets are to be issued on all cars running over the through routes. In the London County Council area children's tickets will be issued on Saturdays, Sundays and Bank Holidays, but in the Leyton and the West Ham areas the tickets will be issued throughout the week. Children's tickets will not be issued in the East Ham area. The fares apply to children between the ages of five and fourteen, and in the borough of West Ham are as follows:—½d. fare for ordinary ½d. and 1d. stages; 1d. for ordinary 1½d. and 2d. stages; 1½d. for ordinary 2½d. and 3d. stages. The arrangement was put into operation on November 7, and makes the practice, so far as children travelling in the borough of West Ham are concerned, quite uniform. Mr. J. S. D. Moffet, general manager of the West Ham tramways, in reporting to the Tramways Committee recently, said that the London County Council was beginning to see the advantage of uniformity and of a simple fare system which everyone could understand, and he hoped that in time children's fares would obtain throughout the week on the whole of the through routes.

CONTRACTS AND ORDERS.

The British Thomson-Houston Company's tender for a 1,500 kw. turbo-alternator has been accepted by the Blackpool Corporation.

The Bhavnagar State Railways have placed an order with the Motor Rail and Tramcar Company for a 50-passenger rail car, to be equipped with the Dixon-Abbot transmission gear.

Blackpool Corporation has placed an order with Cole, Marchant and Morley for a 25,000lb. surface condensing plant, and with the British Insulated and Helsby Cables, Limited, for H.T. cable and trolley wire.

The Motor Rail and Tramcar Company have just completed for Lombardy Road and Railways Company two chassis equipped with the Dixon-Abbot transmission gear. These chassis are precisely the same as those on the East India tramways, which have proved so successful during the past five years.

Coventry City Council has been recommended to accept the following tenders:—Turbo-alternator, British Thomson Company, Limited, £10,810; four marine-type boilers, Babcock and Wilcox, Limited, £11,166; double stokers, Bennis and Co., £2,220; four economisers, Green and Son, £3,524; bunkers, boiler-house framework, and coal and ash-handling plant, Bennis and Co., £11,016; induced-draught plant, Babcock and Wilcox, Limited, £3,595; pipework, Stewarts and Lloyds, Limited, £2,846; cast-iron tank, Matterson and Co., Limited, £360; cooling towers, Worthington Pump Company, Limited, £3,200.

PERSONAL.

Mr. A. Beasley, general manager of the Taff Vale Railway, has been elected chairman of the General Managers' Conference for 1915.

Mr. J. F. Cameron, electrical engineer to Northampton Corporation, has been recommended by the Tramways Committee for the position of temporary manager in succession to Mr. J. Gottschalk, resigned.

Mr. Ernest B. Martin, borough and also tramways permanent way engineer of Rotherham, has been recommended to Salford Council for appointment as borough engineer in succession to the late Mr. Joseph Corbett.

Alderman J. H. Rodgers has been re-elected chairman of Newcastle-on-Tyne Tramways Committee. In returning thanks to the committee, Mr. Rodgers said that this was the sixth occasion on which he had been elected to that important position, and he felt it a very great honour. He had now been chairman and vice-chairman of the committee for nearly 11 years. The work was no sinecure, but so long as they had confidence in him and he had health to discharge the duties he was quite prepared to do what he could to further the work of the tramways.

Mr. Manners, the general manager of the Malta Tramways Company, has returned to Valetta, after a visit to London on business. The *Malta Daily Chronicle* in referring to Mr. Manners' arrival, alluded to "the very satisfactory working which characterises the present management of the company. There is nothing more distasteful to us," the journal adds, "than to have to give expression to public complaint, and it is all the more agreeable to be able to testify to the high approval of passengers on the different lines. We are glad to be able to pay a tribute to Mr. Manners' energy, which has established the Malta tramways as a useful and reliable service combining safe working, willing and courteous administration and efficient control."

PROVINCIAL TRAMWAYS COMPANY.

EFFECT OF THE WAR.

Mr. Andrew Beattie, D.L., J.P., presided at the 57th ordinary general meeting of the Provincial Tramways Company, Limited, held on November 27, at the offices, Moorgate Station Chambers, London, E.C.

The chairman paid a tribute to the memory of Mr. John Glenn, C.E., one of the directors who had died since their last meeting. He had been connected with the company since its formation, and was a man of great ability and energy, and the directors felt that they had lost a good friend and valuable colleague. The chairman went on to deal with the report and statement of accounts for the year ended on the 30th of September last. The profits were £40,297 10s. 11d., which were a little less than a year ago, but which, under the circumstances, might be considered satisfactory. Up to August last the receipts were some £4,534 in excess of 1913, but the result of the war was an enormous decrease in the daily receipts. "Don't find fault with the directors," the chairman continued, "but place the blame on the real culprit, the Kaiser, so that in place of having an increase of £6,000 or £7,000, as we would have if the war had not taken place, our increase was reduced to £1,623. This we look upon with complacency." The decrease in net revenue was, he said, £542 8s. 4d., and as to the distribution of the profits, he regretted that they did not see their way to pay 8 1-5 per cent., as last year. They believed it would be more prudent to reduce the dividend to 7½ per cent. and increase the carry over. The entire rolling stock, permanent way, and other property was well maintained, and had it not been for the terrible war the year would have been by far the best in the history of the company. As to the future, no one could tell what would happen. The money spent by reason of the war would be gladly paid by the nation generally, and they would do their part gladly, but the thousands of men who lie in foreign graves were the greatest loss, and should impress them more deeply than any small temporary loss to which they might be subjected. As to the present year, he was glad to tell the shareholders that since the 1st of October they were roughly £2,000 better off in receipts than for the corresponding period last year. He moved the adoption of the report and statement of accounts, which was seconded by Mr. Samuel Hern, and adopted without discussion. Votes of thanks were passed to the chairman and directors, and to the management and staff in London and the provinces.

FINANCIAL REPORTS AND MEETINGS.

British Electric Traction Company.—Dividend on the 6 per cent. preference stock for the half-year ended September 30 has been declared.

Cordoba Light, Power and Traction Company.—After providing for debenture interest, etc., the net profits for the year ended September 30, including £23,501 brought forward, were £44,321. The dividend on the preference shares has been paid, leaving £26,321 to be carried forward.

Morecambe Tramways Company.—The annual meeting of this company was held in Morecambe last Saturday, when accounts were presented showing a disposable balance of £916, out of which the directors proposed a dividend of 2 per cent., absorbing £330, and allowances of depreciation on rolling stock, £300, and on the track of £150, leaving £76 to carry forward. Mr. W. H. Pickles, who presided, said that in view of the circumstances the result of the year's working must be regarded as fairly satisfactory. After the declaration of war the receipts fell off very considerably, and for three months showed a reduction of 21 per cent. The motion for the adoption of the report was agreed to, and Mr. G. H. Petty, manager and secretary of the company, said that they were fortunate to be able to pay a dividend at all. He was afraid they must not expect too much from next year's working. The staple trade of Lancaster was very much disorganised, and the earning power of the people was greatly reduced. Until something like normal conditions prevailed, he was afraid they could not expect a very great amount of money coming into Morecambe.

East India Tramways Company.—At the meeting of this company on November 30, the chairman said that for the past year the result was on the whole satisfactory. Although petrol, wages, etc., had increased their working expenses by £1,060, the amount available for dividend, owing to the fact that they did not need to place so large an amount to reserve as last year, was greater. Moreover, the bad result of their road motor vehicles experiment was compensated by their experience that the operating expenses per

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passenger mile were fully twice as much as of the company's motor tramcars at Karachi, thereby indicating in how little danger the company's tramway business was of being prejudiced by competition with motor omnibuses or chars-a banc. So far the company's business had not suffered much from the war, and as the Indian wheat crops were promising, subject to unforeseen contingencies, the prospects for the ensuing year appear favourable. A dividend of 10 per cent. was declared. As £20,000 of accumulated profits were capitalised last year, this year's dividend on the increased capital is equivalent to 16 2-3rds per cent. on last year's capital.

Newcastle-on-Tyne.—At the annual meeting of the Newcastle Tramways Committee, held on November 25, Alderman J. H. Rodgers, who was re-elected chairman, made a review of the results of working the tramways during the six months ended September 30. In that period, he said, the cars carried 31,043,032 passengers, showing an increase of 3,044,133 over the corresponding six months of last year. The gross traffic receipts were £136,858, an increase of £13,852. The miscellaneous receipts brought up the total revenue for the period to £142,066, an increase of £14,322. The total expenses amounted to £80,179, an increase of £6,912. Part of the increase was due to concessions granted to the men. After allowing for capital charges, income tax, etc., there was a surplus of £17,522, compared with £16,820. Out of this net surplus they contributed to the rates £9,000, against £6,000 in the corresponding half-year. Their contribution to the Tyneside Company had been £5,435, against £4,158. The figures were perfectly satisfactory, but there was no margin for any concessions. It would take all the profits of the next half-year to keep up the reserve fund to its full amount of £100,000.

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 57 of the principal undertakings of the United Kingdom for the week ended November 28 give total receipts of £203,143, or £4,097 less than in the corresponding week last year. The total length of track was 2,630 miles, or 24 more than for the corresponding week. The receipts this year were at the rate of £77 4s. 9d. per mile of track, and last year at the rate of £79 10s. 6d., thus giving a decrease for the past week of £2 5s. 9d. per mile open.

Coal Market.—Owing to the difficulties of navigation and scarcity of supplies in consequence of the demand of the Allied Admiralties, quotations can now be given only at time of actual delivery.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return.		Aggregate		
		1912-3.	1913-4.	Wks.	1913-4.	Increase or Dec.
Anglo-Argentine	Nov. 25	£58,239	£50,763	47	£2,531,502	— £73,547
Auckland (28 days)	Nov. 20	10,497	19,391	20½	104,518	+ 12,264
Ballarat and Bendigo	Oct. 11	3,629	3,312	28	23,934	— 583
Brazilian St. Rly. Mlrs.	May	44,890	50,237	43	523,872	+ 76,626
Brazilian Trctn. Mlrs.	Sept.	6,028,078	6,096,940	39	55,170,088	+1,346,273
Brisbane	October	27,250	28,763	43	288,621	+ 28,603
British Columbia $	Sept.	734,283	650,516	13	2,015,351	— 245,503
Buenos Aires Pt. & City	June	6,791	6,733	26	43,250	+ 3,148
Buenos Aires Lacroze	July	45,221	43,327	4	43,327	— 1,894
Calcutta Rs.	Nov. 28	66,424	57,364	47	31,40,683	+ 41,669
Cape Town	October	12,323	12,682	17	49,456	+ 2,953
Carthagena & Herrerias	Nov.	1,922	1,379	47	24,067	— 4,098
Cordoba	October	13,278	12,919	30	94,886	+ 883
East India	Nov.	1,922	2,029	17	8,128	+ 295
Kalgoorlie	Sept.	3,068	2,864	38	23,980	— 2,467
La Plata	Nov.	5,409	4,540	47	50,933	— 4,907
Lima	Sept.	34,177	28,786	43	300,472	— 210
Lisbon Mlrs.	July	164,715	171,179	31	1,143,064	+ 45,838
Madras (14 days) Rs.	Nov. 30	25 530	24,558	47	6,10,734	+ 24,421
Manila $	October	148,000	125,750	43	1,341,070	— 48,025
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	Sept.	61,969	58,664	39	556,386	+ 25,393
Mexico $	October	616,007	558,990	43	6,072,755	+ 340,417
Montevideo	Nov.	30,531	27,081	4	27,081	— 3,450
Port Elizabeth	October	3,553	3,372	17	12,522	— 538
Puebla $	Sept.	51,100	52 200	39	534,500	+ 18,800
Rangoon	October	5 963	4.600	43	50,657	— 942
Shanghai $	Oct. 21	25,147	24,925	...	...	...
Singapore $	Oct. 24	11,593	9,205	...	487,401	— 27,088
Toronto $	Sept.	865,796	879,321	39	7,822,107	+ 438,637
Winnipeg $	Sept.	331,732	310,996	39	3,071,940	+ 90,506

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return.			Aggregate.		
		1913.	1914.	Incr. or Dec.	Wks.	1913-4.	Increase or Dec.
Aberdeen Corporation	Nov. 25	£1,424	£1,465	+ £41	26	£43,700	+ £730
Accrington Corp.	,, 25	569	416	— 153	34	18,717	— 1,122
Ayr Corporation	,, 28	239	220	— 19	28	11,266	— 970
Bath Electric	,, 25	736	680	— 56	47	45,510	+ 18
Birkenhead Corp.	,, 29	1,416	1,181	— 235	34½	43,932	— 1,619
Birmingham Corp.	,, 28	12,291	11,734	— 557	35	422,091	+ 10,871
Blackburn Corporation	,, 25	1,284	950	— 334	35	45,853	+ 686
Blackpool Corporation	,, 26	504	513	+ 9	35	64,059	— 9,908
Bolton Corporation	,, 29	2,786	2,387	— 399	35	95,571	— 804
Bournemouth Corp.	Dec. 2	1,621	1,654	+ 33	35	73,068	— 3,966
Bradford Corporation	Nov. 28	5,594	5,615	+ 21	35	217,697	+ 8,977
Brighton Corporation	,, 29	854	776	— 78	34½	40,142	— 354
Bristol	,, 27	6,915	7,679	+ 764	47½	405,523	+ 23,216
British Elec. Federatn.	*	...	...	...	...	...	...
Burnley Corporation	Nov. 28	1,631	1,236	— 395	35	54,184	— 5,977
Burton-on-Trent Corp.	,, 29	275	267	— 8	35	10,485	+ 237
Bury Corporation	,, 29	1,339	1,104	— 235	34½	47,081	+ 761
Cardiff Corporation	,, 28	2,619	2,342	— 277	34	96,453	+ 18
Chatham and District	,, 26	812	886	+ 74	47	45,451	+ 1,528
Chesterfield Corp.	,, 25	251	231	— 20	34	9,312	+ 318
Colne Corporation	,, 28	254	193	— 61	...	...	...
Cork Electric	,, 26	446	424	— 22	47	23,614	— 118
Croydon Corporation	,, 20	1,546	1,469	— 77	33	58,383	+ 2,060
Darlington Corporation	,, 28	242	238	— 4	35	9,252	+ 488
Derby Corporation	,, 21	929	904	— 25	33½	34,582	+ 741
Dover Corporation	,, 28	180	197	+ 17	35	9,054	— 39
Dublin & Lucan	,, 27	112	105	— 7	21½	3,186	— 29
Dublin United	,, 27	4,747	5,365	+ 618	47	277,488	+ 17,940
Dundee City	,, 25	1,844	1,186	— 658	27½	36,077	— 658
East Ham Corporation	,, 28	951	1,167	+ 216	34½	40,962	+ 5,675
Exeter Corporation	,, 27	286	276	— 10	35	12,524	+ 196
Gearless Motor 'Buses.	*	...	...	...	...	...	...
Glasgow Corporation	Nov. 28	20,696	19,572	— 1,124	25	523,932	+ 419
Glossop (U. Elec. Supply)	,, 28	122	91	— 31	48	5,790	— 426
Halifax Corporation	,, 24	1,940	1,854	— 86	34	76,586	+ 2,786
Hastings & District	,, 25	781	661	— 120	48	48,056	+ 2,848
Huddersfield Corp.	,, 28	2,051	2,199	+ 148	35	102,353	+ 8,068
Hull Corporation	,, 28	3,170	2,932	— 238	35	108,599	— 1,386
Ilford U.D.C.	,, 28	433	548	+ 115	35	19,771	+ 3,970
Ilkeston Corporation	Dec. 2	127	114	— 13	35	4,601	— 221
Ipswich Corporation	Nov. 28	365	347	— 18	35	16,330	— 278
Isle of Thanet	,, 28	323	253	— 70	8	3,039	— 486
Kilmarnock Corp.	,, 28	166	142	— 24	28	4,629	— 418
Lanarkshire	,, 26	1,828	1,598	— 230	47	88,131	+ 7,018
Lancashire United	,, 25	1,551	1,358	— 193	47	76,884	+ 3,431
Leeds City	,, 28	8,093	7,825	— 268	35	288,931	+ 21
Leicester Corporation	,, 28	2,795	2,664	— 131	48	136,121	+ 2,236
Leith Corporation	,, 28	663	624	— 39	28	20,608	+ 198
Leyton U.D.C.	,, 26	1,283	1,296	+ 13	33	46,995	+ 2,054
Liverpool Corporation	,, 28	12,793	12,113	— 680	47½	693,055	+ 8,255
Llandudno & Colwyn B.	,, 27	154	143	— 11	52	15,616	— 2,057
London County Council	,, 25	41,687	43,939	+ 2,252	34	1,513,507	+ 131,334
London Gnl. Omnibus.	*	...	...	...	...	...	...
London United	*	...	...	...	...	...	...
Lowestoft Corporation	Nov. 28	171	161	— 10	8	1,530	— 168
Maidstone Corporation	,, 26	177	148	— 29	35	7,501	+ 158
Manchester Corp.	,, 28	17,616	16,399	— 1,217	35	603,819	— 10,133
Met. Elec. Trys.	*	...	...	...	...	...	...
Nat. Steam Car Co., Ld.	Nov. 30	4,896	4,073	— 823	4	15,085	+ 653
Nelson Corporation	,, 28	217	162	— 55	34½	6,603	— 843
N'castle-on-Tyne Corp.	,, 28	5,054	5,586	+ 532	35	190,237	+ 19,254
Newport (Mon.) Corp.	,, 28	769	695	— 74	35	23,752	+ 1,691
New St. Helens & Dist.	,, 25	738	754	+ 16	21	20,349	+ 1,848
Northampton Corp.	,, 27	514	572	+ 58	34½	20,726	+ 323
Nottingham Corp.	,, 26	3,235	3,052	— 183	34½	117,339	+ 1,125
Oldham Corporation	,, 29	2,171	1,891	— 280	36	79,022	— 867
Portsmouth Corp.	,, 28	1,872	1,792	— 80	35	85,336	...
Preston Corporation	,, 25	823	793	— 30	35	32,074	+ 880
Provincial	,, 28	1,672	1,748	+ 76	8½	16,545	+ 1,871
Reading Corporation	,, 26	645	585	— 60	34	24,581	+ 314
Rhondda	,, 26	1,224	1,035	— 189	47	57,947	+ 903
Rochdale Corporation	,, 28	1,549	1,398	— 151	35	57,072	+ 220
Rotherham Corp.	Dec. 2	1,005	950	— 55	35	36,420	+ 928
Salford Corporation	Nov. 30	5,154	4,982	— 172	34	175,868	— 8,032
Sheffield Corporation	,, 29	7,640	7,511	— 129	35½	274,766	+ 6,599
Southampton Corp.	,, 25	1,198	1,047	— 151	34	46,322	— 324
Southend-on-Sea Corp.	,, 25	671	579	— 92	35	37,430	+ 2,180
South Met. Trys.	*	...	...	...	...	...	...
South Shields Corp.	Nov. 28	657	645	— 12	34½	26,865	+ 1,595
Sunderland Corp.	,, 29	1,305	1,342	+ 37	35	52,006	+ 892
Sunderland District	,, 25	630	535	— 95	4	2,034	— 209
Swindon Corporation	,, 25	151	148	— 3	34	6,201	+ 413
Torquay	,, 26	399	322	— 77	47	26,444	— 3,720
Trys. (M.E.T.) 'Buses	*	...	...	...	...	...	...
TynesideTrys. & Tmrds.	Nov. 25	462	486	+ 24	22	13,532	+ 1,997
Wallasey Corporation	,, 28	1,084	994	— 90	34½	44,733	+ 1,154
Walsall Corporation	,, 28	621	625	+ 4	48	30.030	+ 147
Walthamstow U.D.C.	,, 28	674	688	+ 14	35	28,739	+ 2,526
Warrington Corp.	,, 26	457	394	— 63	34	14,975	— 447
West Ham Corporation	,, 26	2,567	2,620	+ 53	34	67,634	+ 3,540
Wigan Corporation	,, 26	1,499	1,310	— 189	34	50,181	— 1,412
Wolverhampton Corp	Dec. 2	1,059	1,016	— 43	36	37,349	— 1,180
Yorkshire (W. Riding)	Nov. 29	1,400	1,375	— 25	48	69,594	— 27

* Issue of Traffic Returns suspended during the War.

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THE Tramway & Railway World
WITH MOTOR TRAFFIC SECTION

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ELECTRIC TRACTION ON THE ITALIAN STATE RAILWAYS: LECCO-MONZA LINE.

BY FRANCESCO SPINELLI

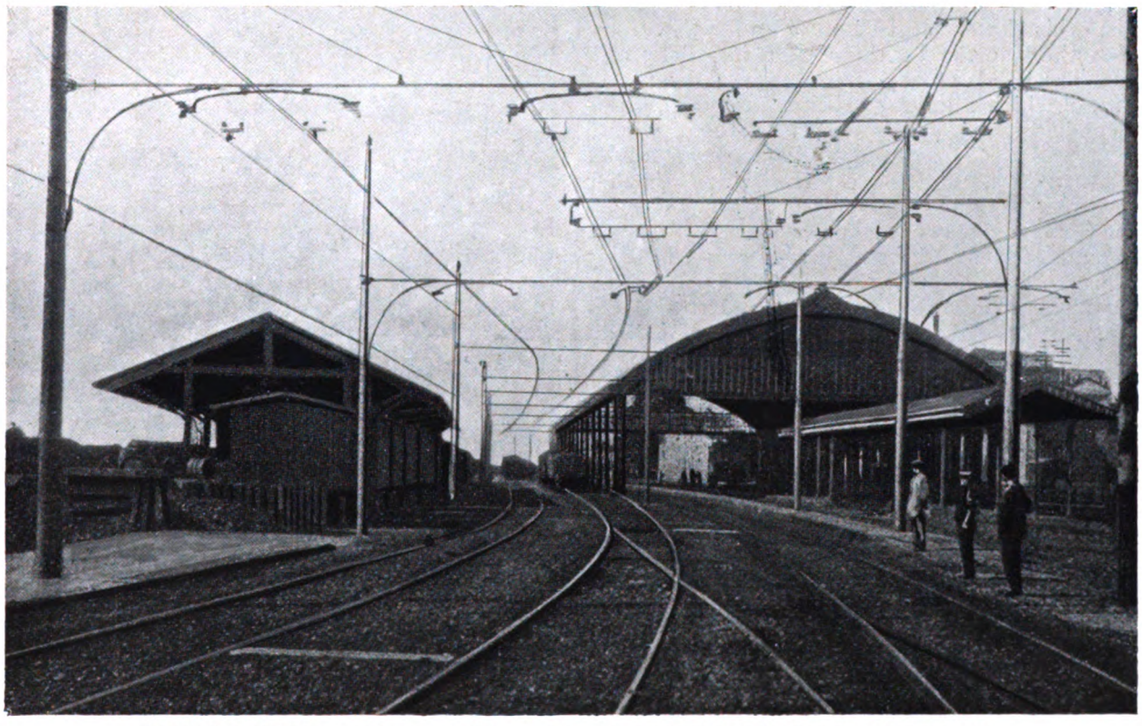
(Engineer of the Works Department of the Italian State Railways).

The electrification of the Lecco-Monza line, in continuation of the Valtellinese Sondrio-Chiavenna-Lecco lines, was dictated by the remarkable development of manufacturing industries in that region, which has necessitated more frequent and rapid communications between Lecco and Milan, and also by the opportunity thus afforded of utilising the electric traction installation already existing at Valtellina. It is to be expected that in view of the advantages in the matter of time, and the comfort which it affords to the public, the new system of traction will give rise to increased developments in the traffic for the Lake of Como, Valtellina, Upper Valtellina, and even for the Engadine.

Athough greatly desired by the inhabitants of these districts, it has not been possible, up to the present, to provide such an installation on account of various difficulties, which even now compel the management to limit it to the Lecco-Monza line, and to postpone to an early date its completion by the extension to the last short section, *i.e.*, Monza to Milan.

During the month of April, the first electric trial runs were made, and in May all the goods trains were driven by electricity; which means that as soon as the high-speed locomotives, which have been delayed in delivery, are available the electric service will be immediately extended to passenger trains.

The Lecco-Monza line is a little under 25 miles in length, of which about 4·5 miles, *i.e.*, the section from Lecco to Calolzio, is a double line. The minimum radius of curve is 650 ft. The maximum gradient is about 1 in 83, and the highest altitude, 948 ft. above the sea, is attained at Olgiate station, and the lowest at Monza, where it is 521 ft., a difference in level of 427 ft.



View of a Station on the Lecco-Monza Electric Line of the Italian State Railways.

THE SUPPLY OF ENERGY.

As the energy available at the hydro-electrical station of Morbegno was not sufficient for working the Lecco-Monza section, the Administration of the State Railways signed a contract on May 9, 1912, for the supply of electric energy, with the "Società Generale Italiana Edison" and the "Società Generale Italiana" for electric railway traction, conjointly. Under this

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agreement the contracting companies guarantee to supply the requisite electrical energy by meter, in the form of three-phase current of a periodicity of 15·8, to three transformer sub-stations situated at Monza, Usmate, and Olgiate.

With the energy supplied by the company, the electric working of the line from Monza to Calolzio was undertaken; the remaining double-line section from Calolzio to Lecco is supplied with energy from the Morbegno supply station. As will be explained later, when speaking of the Calolzio sub-station, the installations are, however, so arranged that the energy can be transmitted from the private power-stations to the Calolzio-Valtellina line and *vice versa*, and the energy from Morbegno to the Calolzio-Monza section.

The Robbiate Electric Supply Station.

The Edison Company of Milan, which in 1898 built, and since that time has operated, the celebrated hydro-electric supply station at Paderno, with an output of about 9,000 KW., found itself obliged to increase the output at the steam station up to 30,000 KW. on account of the remarkable industrial development of Milan, and the large quantities of electric energy required by the commercial classes. Perceiving later that it would be possible, except during some of the winter months, to utilise a larger volume of water economically, viz., 110 cubic metres instead of 45 cubic metres corresponding to the lowest level, the Edison Company decided to construct a new hydraulic plant side by side with the first.

Whilst this latter utilised a fall of 95 ft. in a canal length of 9,754 ft., the recent installation of Robbiate has a fall of 107 ft. in a canal length of 16,408 ft., of which 2 miles 544 ft. are tunnelled. The power conduit consists of seven pipes, six of which, for the generating sets, have a diameter of about 8 ft. 7 in., and one for the exciters with a smaller diameter. The engine room contains six turbines, by Riva and Company, of a normal power of 6,000 H.P., and a maximum of 6,900 H.P., with a working speed of 315 revolutions. There are also six three-phase generators of 4,600 KW. and a periodicity of 42, and two three-phase generators with a periodicity of 15·8, and an output of 4,000 KW.

These two latter, connected with two of the first for the better utilisation and regulation of the energy, are the machines which supply the electrical energy to the Lecco-Monza line. The tension of the two three-phase generators for the railway service is barely 2,000 volts. By means of static transformers, this voltage is brought up to 20,000—22,000, to feed the three-phase cables for electric traction. An interesting feature of the hydraulic installation at the supply station is the "Gregotti" syphons, which act in a very satisfactory manner.

Primary Cables.

The electric energy is transmitted from the Robbiate supply station to the three sub-stations of the company at Usmate, Monza, and Olgiate, as well as to that of the railway administration near Calolzio, by means of underground three-phase cables for the working voltage, which amounts to between 20,000 and 22,000 volts. Two three-phase cables connect the Robbiate station with the sub-station at Usmate, which is the most important of the three, as all the indicating and regulating apparatus for the electrical energy consumed are mounted there; it is measured on the cables on arrival from the Robbiate station.

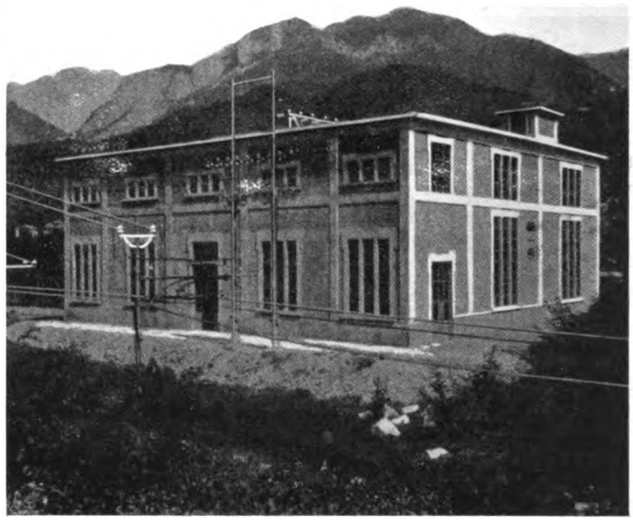
Three tri-phase cables proceed from Usmate; two of these are directed to the sub-station at Monza. The underground cables, which are lead-sheathed and armoured, have a copper section of 3 by 40 millimetres and are made by Messrs. Pirelli and Company, of Milan.

Passing across country from the centre at Robbiate, the cables are led to the railway at Ponte S. Pietro-Seregno. From this point they do not leave the railway track, under which they run at a depth of about 80 cm. below rail level.

A characteristic system of laying down the cables was adopted by the Edison Company. The cable was wound on a drum and placed on a special cable-laying train travelling at slow speed. The cable was made to pass over a raised surface placed at a convenient level, and thence, guided by transmission gear, it fell directly into the trench without any further handling. Laid in a wooden conduit, and closed in with the usual sand and tar mixture, the cable was then left without further covering.

The divisions are about 1,320 ft. in length, and the total extent of the cable is nearly 43·5 miles. Insulation is obtained with paper and woven fabric impregnated with insulating mixtures. External protection consists of the lead sheath packed with paper compound and tarred jute and armoured with hoop-iron bound with tarred jute.

The outside diameter of the cable is about 80 mm., the net weight per metre 13·7 kg. The voltage test at the works was 40,000 volts for half an hour. Portions taken from the drum were submitted to a break-down test and sustained tensions of 217,000 volts (the minimum guaranteed by contract being 75,000 volts).



Calolzio Sub-Station.

The kilometric-electric characteristics of the cable are as follows:

Resistance of the conductors at 15C.	ohm	0·437
Single-phase capacity ...	microfarad	0·Lo
Apparent three-phase capacity	,,	0·103
Cos. ϕ without load ...	,,	0·01

The Sub-stations.

The Edison sub-stations at Usmate and Monza have been constructed according to a plan drawn up by the company and approved by the Administration of the State Railways. They contain four single-phase transformers, the ratio of transformation being 20,000/3,400. One of these is usually kept in reserve.

The converter boards are on the cellular system. Both the transformers and the accompanying electrical fittings were supplied by the Tecnomasio Italiano Brown-Boveri. The transformers are insulated and oil cooled without water circulation, and their total power is 2,250 K.V.A. They have mesh connection. The

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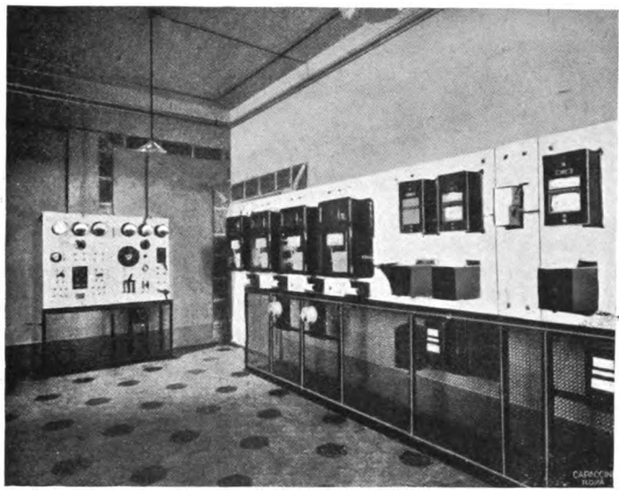
transformers and the fittings are capable of supporting, while remaining in good working order and efficiency, a continuous overload per hour equal to 30 per cent., and an intermittent overload of 100 per cent. These intermittent loads, however, should not last longer than five minutes, and between the end of one over-



Interior of Sub-Station at Usmate.

load and the beginning of the next there should be an interval of at least a quarter of an hour. The transformers are furnished with automatic oil-break switches, mounted in such a manner that the break of the primary switch always entails the break of the secondary, but not *vice versa*. The time relays are of the Brown-Boveri pattern.

The Edison sub-stations are built in two storeys, with openings communicating with the upper storey, as illustrated in the accompanying views, and are arranged to permit of future extensions. The electric apparatus, whether for high or low pressure, is cellular, cells being in earthenware and cement.

At the Usmate sub-station four recorders with relays, C.G.S. (one watt-meter and three ampere-meters) are provided, and also four Siemens recorders (one watt-meter and three voltameters), and four meters.

Two secondary lines, with subterranean unipolar cables at 3,400 volts, and a section of 200 sq. mm., run from the Usmate, Monza, and Olgiate sub-stations, and supply the corresponding sectionalising houses.

Sectionalising Cable Houses.

The Administration of the State Railways has built sectionalising cable houses for the secondary conductors, in connection with each of the Edison sub-stations, from which, as we have seen, the secondary lines in a cable of 3,400 volts are taken to the sectionalising houses. The feeders for the various sections into which the overhead wires have been divided run out from these cable houses. The drawings reproduced on the following page show the disposition of the apparatus in the sectionalising house, and the most simple plan of the circuits in one of the houses is also shown.

The two cables at 3,400 volts from the Edison Company are carried to the two end panels of the switchboard. The current passes through the knife and automatic switches and is carried on to the bus-bars, from which it passes through the switches of the third panel to the various sections of the line.

The cable houses at Usmate and at other places are of the "Servettaz" type, and the panels are on the "Magrini" model. A particularly interesting feature of the Magrini automatic circuit breakers is the time and automatic break relays, which are extremely sensitive. The panels consist of a fixed part comprising the dischargers, the impedance coils, and the bus-bars; and of a movable part bearing the automatic switches, the break relays, the current transformers of the ampere-meters, and the ampere-meters. A special block mechanism prevents the movable panel from becoming detached from the fixed panel unless the automatic break is first made to act.

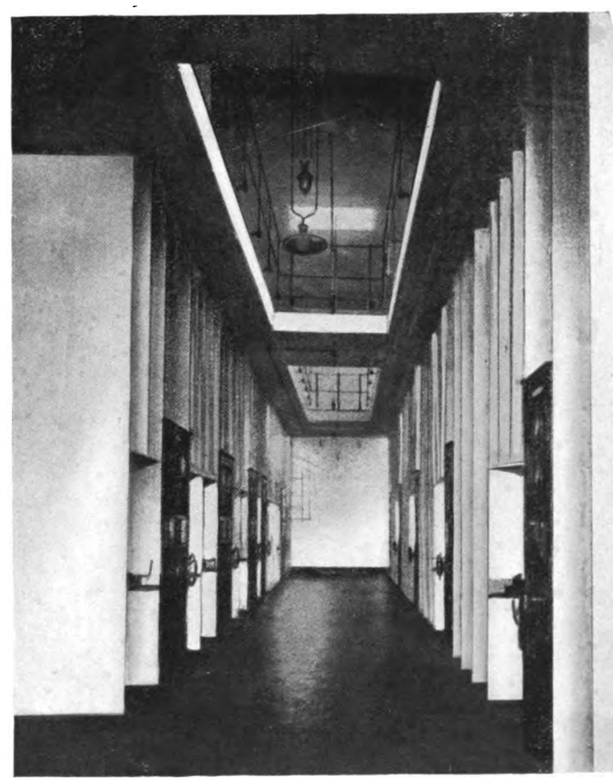
The lower part of the sectionalising house is intended to receive any electric material and tools. The upper part, to which access is gained by ladders with one hand rail, is divided into two portions: the larger contains the switchboards, and the smaller is intended for the telephone and forms a small office for the staff.

The Contact Line.

The contact line, of which several illustrations are given below, is formed by two double-wire conductors having a cross section of 200 sq. mm. for each of the two aerial phases, except over the main or goods lines in the stations, where, for purposes of economy, only a single copper wire is operated for each phase. The third conductor of the three-phase is formed by the rail, in which electric joints are ensured by a special metallic paste, as has been employed in other installations.

Mannesmann poles are used, and have an outside diameter of 140 mm. at the base on the line, and 270 mm. at the stations. The distance from pole to pole was fixed at 20 meters, in order to ensure good working of the current contacts at the highest rate of running, viz., 95 to 100 kilometres per hour.

Insulation of the contact line is obtained by means



Interior of Sub-Station at Usmate.

of porcelain insulators of the "Cenisio" and "Succursale" patterns, supplied by Messrs. Richard Ginori and Company. This is quadruple between the two aerial phases and triple between these and the rail, which, as stated, forms the third phase.

The poles of the contact lines and feeders are all connected by a ground wire, the so-called protecting wire, in galvanized iron of about 11 mm. in diameter.

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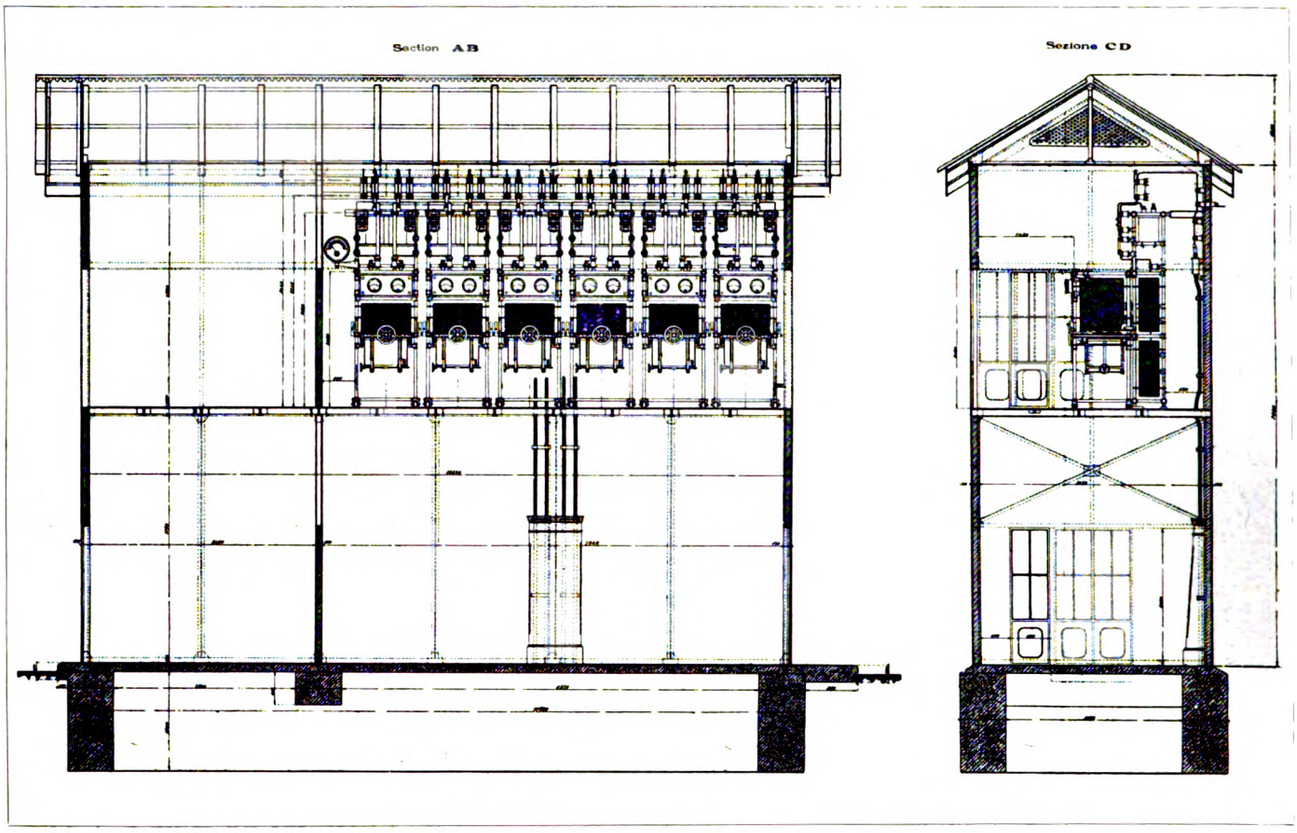
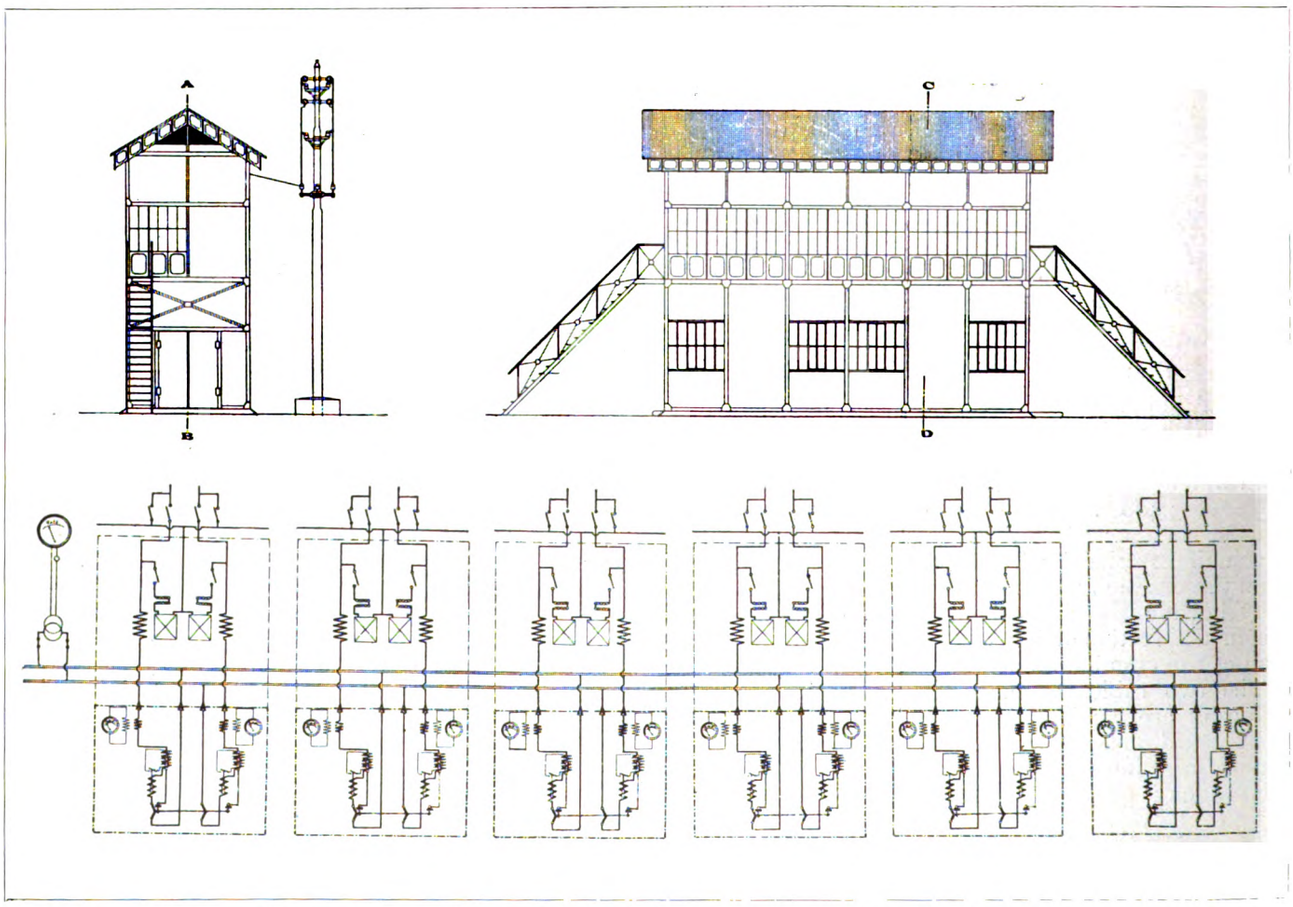


Elevations of Sectionalising House.



Arrangement of Electric Circuits in Sectionalising House at Macciamico.

ELECTRIFICATION OF LECCO-MONZA LINE OF ITALIAN STATE RAILWAYS.

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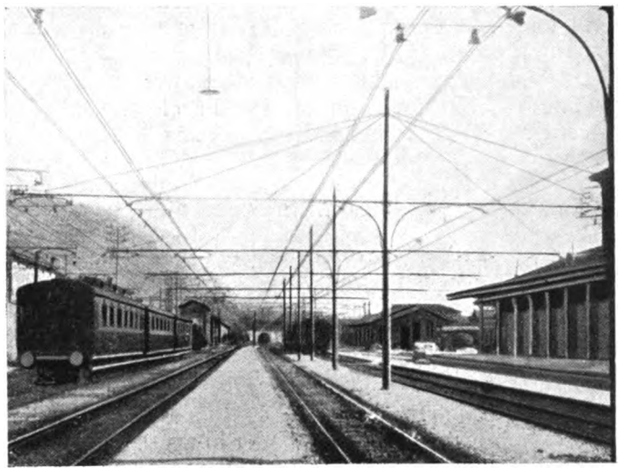
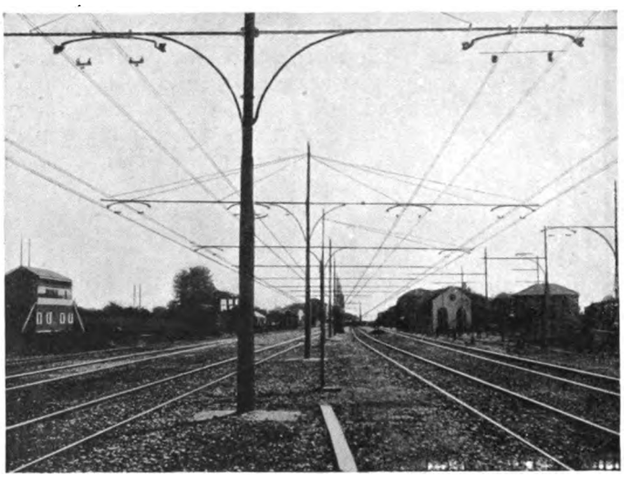
One pole in 10 is in metallic connection with the track. The two rails of the track are connected every 200 metres by an iron cross-tie. The protecting wire serves, amongst other purposes, to safeguard the lead-sheathed cables containing the railway telegraph, and the lines for telephonic communication between the



Centre-Pole Construction at Station.



Overhead Work at Usmate Station.

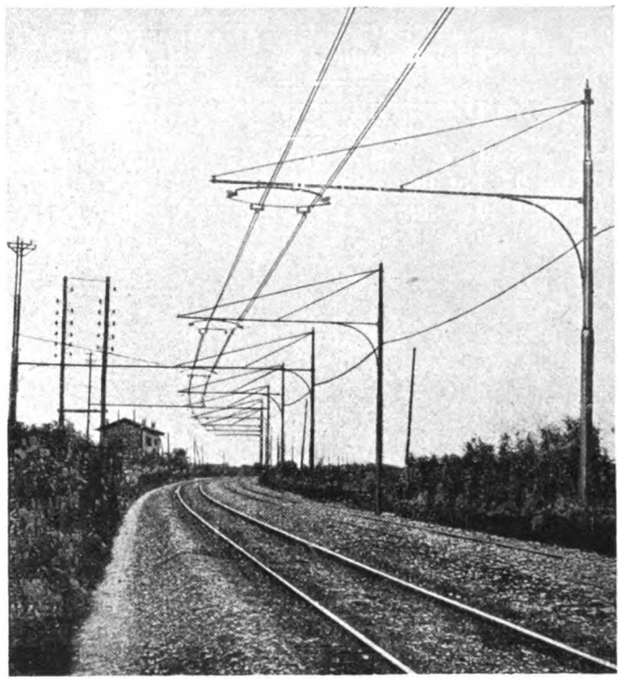
cable houses, the sub-stations, and the principal points along the line.

Stations and Buffer Lines.

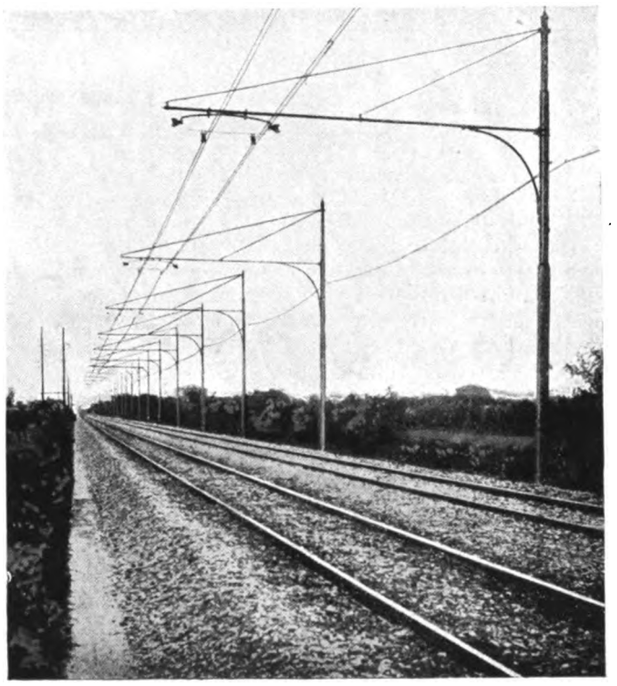
According to the rule generally adopted in installations of the kind (Giovi, Cenisio, etc.), the electric installation for contact at the stations is separated by means of special insulators from that of the whole line; thus, between the first and the second sections, a length of about 30 metres, known as the buffer line, is interposed. This is perfectly insulated by special mechanism to which pressure is supplied by means of apparatus known as automatic breaks with relays at two pressures. These apparatus automatically effect the insertion of a buffer track by the aid of a three-phase motor, fed by a transformer, whenever the pressure on the main line gear and on that in the station is regular, or, as might be said, on the two sections between which the buffer track intervenes. On the other hand, they disconnect when pressure is wanting in one of the two sections, or when it falls below 2,000 volts.

The most important stations in the Lecco-Monza line are the two termini. Lecco is the better from the point of view of electric installation; 50 points have been electrified in this station, two of which are double-switch, on the English system.

On account of the insufficient width between the rails, it has been necessary to pass over large distances with tubular suspensions, right across the tracks, to support the gear. At one point it was necessary to construct a tubular suspension, held up by cross-ties to the two lateral poles, of the exceptional length of 33 metres.



Typical Overhead Equipment on Curve.



Typical Equipment on Straight Line.

Calolzio Sub-station.

The sub-station of Calolzio, built in connection with the line Bivio-Bergamo-Milan, at a short distance from

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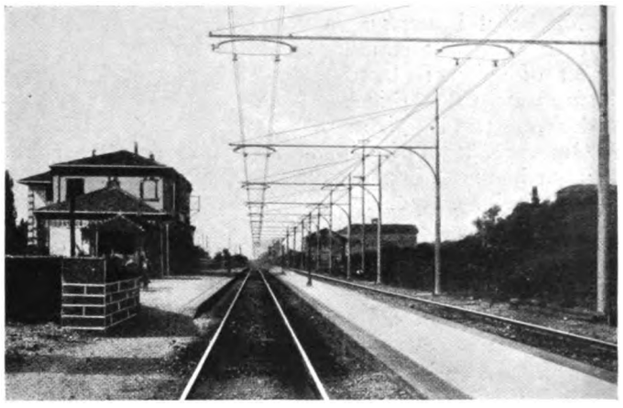
the bridge over the Adda on the Monza-Calolzio line, answers a double purpose. The first is that of reducing the pressure of the primary lines, both from Valtellina and from the Edison Company, from 20,000 to 3,400 volts, and of feeding the contact line in the section towards Lecco with energy which comes from the Morbegno (State) supply station; and the section towards Milan with the energy from Robbiate (Edison station).

The primary lines from Morbegno feed a group of three single-phase transformers, Thomson-Houston, of 750 K.V.A. each, and a ratio of transformation of 20,000/3,400 volts, and periodicity of 15. The primary cable, coming from Olgiate, feeds a second group of single-phase transformers, three in number; a third group, also of three, is kept in reserve.

Both the primary and secondary bus-bars are double, and it is necessary to keep those which are fed from the Morbegno supply station and those fed from Robbiate quite distinct. In order that there may be no connection between the two supply stations, caused by the trolleys of the trains running from one section to another of the contact line, a buffer track, 25 metres in length, has been arranged in connection with the Calolzio sub-station. It is completely insulated, and the trains pass over it normally by their own momentum. In the rare case (which should never occur, but which is not impossible) in which, by reason of something



Cernusco-Merate Station.

abnormal in the service, a train were obliged to stop on this insulated track, by operating the necessary switches, which are normally disconnected, the attendants could convey the secondary pressure from Valtellina to the insulated track if the train were going towards Lecco, or the Edison pressure if it were going towards Milan. The second and more important function of the Calolzio sub-station is to assure the working in the case of connection between the Lonza-Calolzio line and the Calolzio-Valtellina line, and in the case of a breakdown at the Morbegno supply station, to transmit the electric energy from Robbiate to the Valtellina lines and *vice versa*.

As all direct metallic connection between the primary aerial Morbegno-Calolzio lines and the underground three-phase cable, at least of 20,000 volts, from the Robbiate Station, is for obvious reasons not allowed by the contract; the transmission of energy from Robbiate to the primary conductors of Calolzio-Valtellina is made by connecting the secondary bus-bars, of 3,400 volts, in series. Consequently the energy from the Robbiate station, transformed to 3,400 volts in the secondary bars with a cross section of 500 sq. mm., is increased to 20,000 volts by means of the group of transformers connected with the Valtellina line, and is transmitted to that, for distribution over the line to the north of Lecco.

The connection and disconnection of the switch breaks, both primary and secondary, is effected by a suitable switchboard with pulsators and indicator lamps, by means of remote electrical actuation on the well-known Brown-Boveri system.

A group of rotary converters of 10 H.P. feeding a storage battery serves for all accessory purposes. In the form of continuous current of 110 volts, it supplies the necessary energy for the working of the motors for remote driving of the switches with visible indicators, and for the illumination of the sub-station as well as for the working of the crane, etc.

First Technical Results.

The results of the first trials in electric traction recently carried out in the Lecco-Monza line have been exceedingly gratifying. From the very first trial run a new and striking assurance was obtained that the system of electric traction satisfies all the requirements of a heavy railway service in a perfectly effective manner. As the high-speed locomotives were not ready, those of the class E-550 (type Giovi and Cenisio) were employed for the first trials.

To give a clear idea of the technical results obtained it will be sufficient to mention that, with a single locomotive of about 60 tons, it was found possible to draw a train of slightly less than 600 tons on an incline of 1 in 83, and on a curve, at ordinary speed, *i.e.*, 30 miles per hour. The loss of pressure along the line has always remained a negligible amount, varying between 5 and 8 per cent. of the normal value, a most satisfactory result when it is remembered that, on an average, the centres of supply of energy are seven miles from the contact wires.

During all the time of the trials and in the subsequent working period there has not been even the slightest difficulty in connection with the installation in the stations or along the line. It is therefore with the liveliest satisfaction that the "*Rivista Tecnica Ferrovie Italiane*," from which this article has been specially translated for The Tramway and Railway World, has placed on record this new and unquestionable success of electrical engineering on the Italian railways.

LONDON TRAFFIC FATALITIES.

In answer to a question by Mr. Kellaway in the House of Commons, the Home Secretary has given the following figures of street traffic fatalities in the Metropolitan Police area:

1914.	July.	August.	September.	October.
Horse-drawn vehicles	13	9	11	20
Omnibuses	12	8	15	21
Taxi-cabs	2	5	7	6
Tramcars	4	1	4	3
Private motors	10	13	10	13
Motor cycles	—	2	3	3
Commercial motors	10	12	18	18
Totals	51	50	68	84

The accidents due to tramcars are gratifyingly few, and strongly corroborate the view so often expressed in these columns that tramways are far safer than any other means of public traffic. In the City of London Police area, where comparatively low speeds are enforced, there were only seven fatal cases in the four months—three by motor omnibus, two by horse-drawn vehicles, and one each by motor cycle and heavy motor car.

Aluminium Conductors.—The British Aluminium Company have issued a new edition of their pamphlet on electric power transmission by aluminium conductors. It consists largely of a study of the economical and technical aspects of the use of aluminium as a transmission line conductor. In making comparisons with copper, every possible factor influencing the cost has been considered, while certain additional matter has been included, together with useful tables and diagrams. The relative properties of aluminium and copper are well explained and leading facts set out in comparative tables. Among other advantages it is shown that aluminium conductors for high-tension transmission lines are cheaper than those made of copper. The pamphlet, which is well illustrated, is worthy of close study.

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A LARGE MOTOR CONVERTER.

AN IMPORTANT EXTENSION AT DICKINSON STREET STATION, MANCHESTER.

A motor converter of 2,200 KW. capacity has recently been erected and put into service at the Dickinson Street station of the Manchester Corporation Electricity Department, which is of particular interest in that it is the largest converting unit yet installed in Great Britain. It is used for the conversion of the Corporation 6,600-volt, 50-cycle, three-phase supply into continuous current at a pressure of from 420 to 550 volts, and runs at a speed of 250 revolutions per minute.

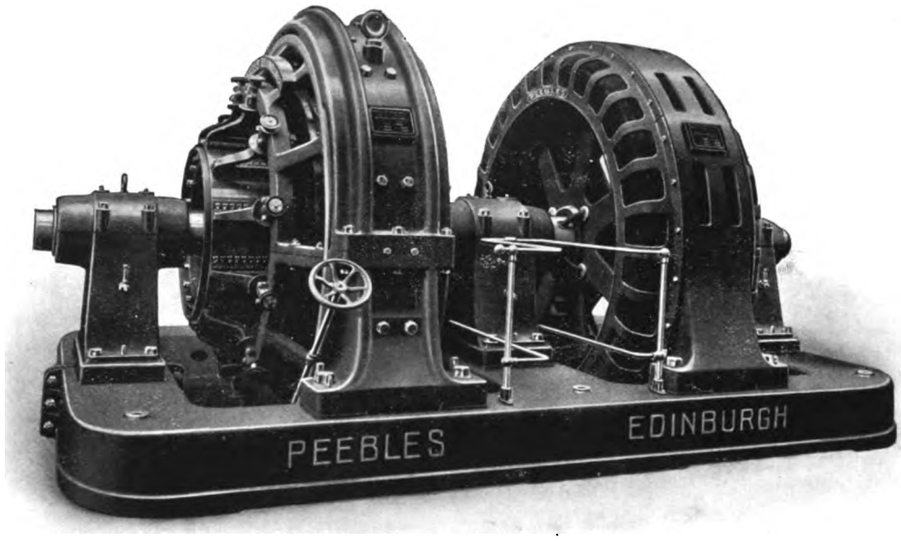
It will be seen from the illustration that the machine is of the three-bearing type, the bed plate, owing to its size, being made in two parts.

As is well known, the motor converter occupies the minimum space for a given output, and the set has much the same general appearance as an induction motor generator. It embodies the simplicity of this type of plant, and at the same time possesses valuable features peculiar to itself. The high-tension current is taken direct to the stator, thus obviating the interposition and complication of the transformer, while, of course, all rotating parts only carry low-voltage currents. The rotor of the alternating-current end and the armature of the direct-current end are electrically connected by leads passing through the hollow portion of the shaft, as may be seen from the illustration, which also shows the massive construction of the direct-current brush gear. The field magnet frame is of cast steel fitted with 12 laminated main poles and 12 solid commutating poles, the windings being so arranged that the converter will operate equally well as a shunt machine at 420 to 460 volts, or as a compound set at 520 to 550 volts.

Provision is made for the converter to run as a three-wire balancer, this being obtained without complication by simply connecting the middle wire through a change-over switch (provided on the starter) to the star point of the alternating-current rotor winding, the voltage regulation between the two sides of the system being exceedingly close even with large out-of-balance currents.

The power factor is practically unity at all loads, and being entirely automatic requires no attention, as is the case with some other types of converting machinery. The starting and synchronising of the set is the simplest of operations, requiring no special skill or previous experience, while the entire absence of complicated switch gear, the small number of brushes (especially on the direct-current side), and proved reliability of performance, are features which will appeal to the engineer who is responsible for the running of electrical plant.

The plant was manufactured by Messrs. Bruce Peebles and Company, Limited, of Edinburgh, who, we understand, hold the exclusive patent rights in Great Britain and the Colonies for this type of machine, which was built under the Peebles-La Cour patents.



2,200-kw. Peebles Motor Converter.

NOTABLE WORK OF BRITISH RAILWAYS AT THE OUTBREAK OF THE WAR.

The members of the Railway Executive Committee of Great Britain were on November 13 the guests of honour of the American Luncheon Club at the Savoy, when some remarkable facts were related by Mr. H. A. Walker, general manager of the London and South Western Railway concerning the way the railways had handled the military traffic at the outbreak of war.

"The Government," said Mr. Walker, "gave the railways a time limit of 60 hours to make ready for despatch to Southampton, the port of departure for the Expeditionary Force, 350 trains of, roundly, 30 vehicles each. We 'delivered the goods,' as Americans would say, in 48 hours. At Southampton, for practically every day of the first three weeks of the war, we handled during a period of 14 hours no fewer than 73 of these trains, including the running of them to the boat side and the unloading of the full equipment of guns, ammunition, and horses. The trains arrived at intervals averaging 12 minutes. It was a matter of special pride to all the railwaymen concerned—and we general managers give credit for the feat to the efficiency of our disciplined staffs—that practically every train without exception came in on scheduled time. Some of them came from remote parts of the kingdom—Wales and the north of Scotland."

Mr. H. W. Thornton, general manager of the Great Eastern Railway, in acknowledging a tribute which the previous speaker had paid to his zeal during mobilisation, said that so far as his knowledge of great transportation achievements went, there was no event in railway history to compare with what British lines had accomplished in August, 1914. Certainly in America, the land of "big stunts," there had never been anything like it.

Sir Guy Granet, general manager of the Midland Railway, who also spoke, declared that primary credit for the really remarkable work performed by British railways during the days of mobilisation was due to the energetic direction of the Railway Executive Committee's labours by its chairman, Mr. H. A. Walker.

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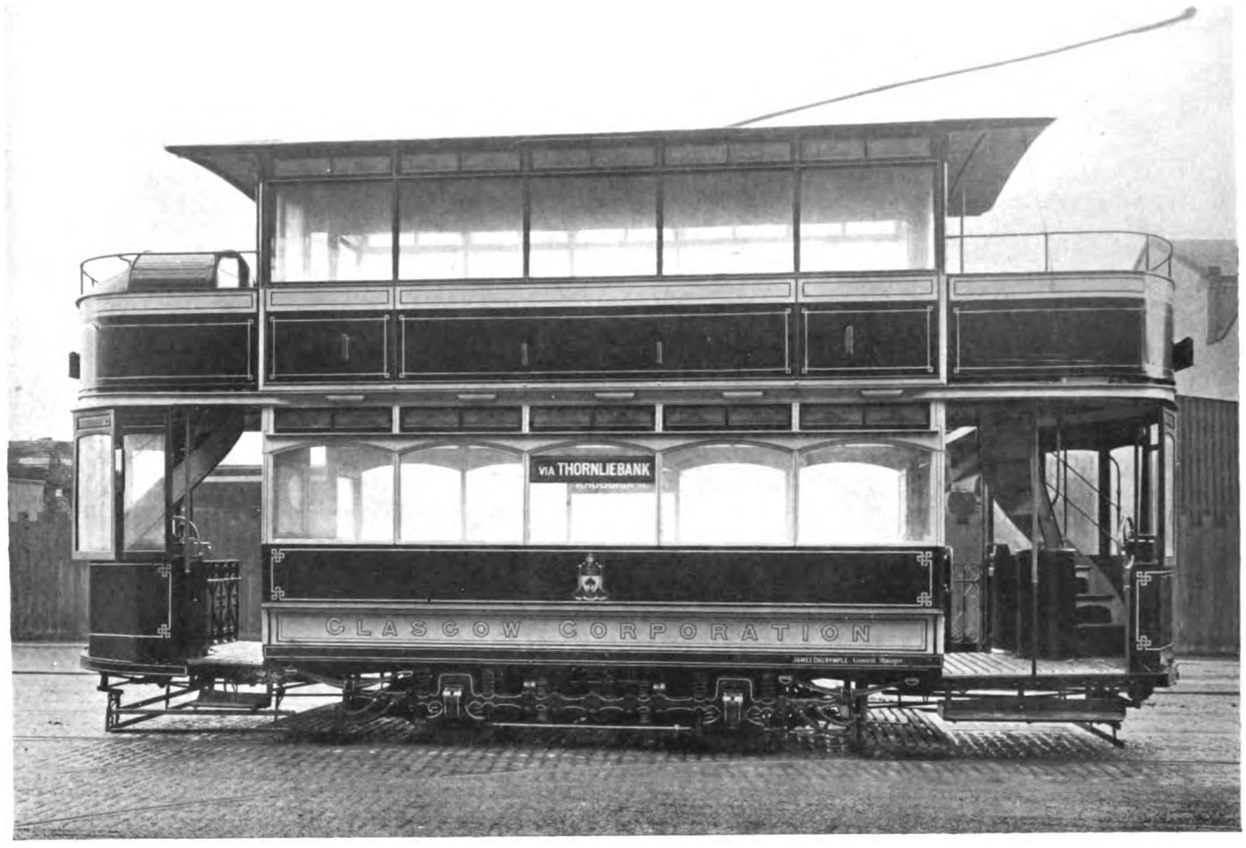
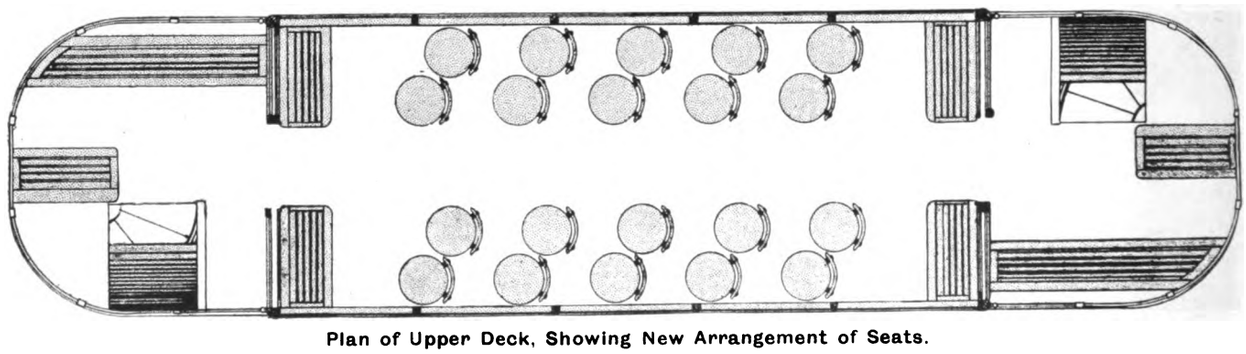
A NEW TYPE OF CAR IN GLASGOW.

The Glasgow tramway authorities have in the past been somewhat conservative in the matter of car design. It is true that when they first started electric traction they tried a number of single-deck bogie cars of ponderous appearance, these cars being divided into two compartments each, one compartment being for smokers. Experience did not encourage the multiplication of cars of this type, and a settled conviction was arrived at by the department that the most suitable car for Glasgow conditions was a four-wheeled vehicle of moderate size and as light as practicable. The ideal was—and is—to use these light cars in such numbers as to give all the accommodation required, and to depend largely on their easy mobility and on rapid starting and stopping. The comparatively ponderous eight-wheeled double-deck car with its greater carrying capacity, but with its much greater demand for energy during acceleration, has found no place in Glasgow. Nor can fault be found with the policy, when one considers the great density of population and the consequent large proportion of short-distance passengers and the constant stopping and starting of the cars.

When roof covers came along these were adopted, but otherwise the standard car did not present much difference to the eye. The canopy does not cover the ends of the upper deck, so that there are open-air seats both in front and at the rear for those who prefer them. Inside the canopy there are the usual cross seats with central aisle, and they possess the discomfort usual in such an arrangement in being rather short for two passengers. The department are now experimenting with a new type of car which promises to remove the trouble mentioned, and also possesses other advantages.



Exterior of Glasgow Corporation Car with New Seating Arrangement on the Upper Deck.



Plan of Upper Deck, Showing New Arrangement of Seats.

The arrangement of seats on the upper deck is most ingenious, and it ought to prove of great benefit to passengers.

One of the ordinary cars was taken in hand and altered. In the first place, the platforms are arranged so as to give a front exit for the downstairs passengers.

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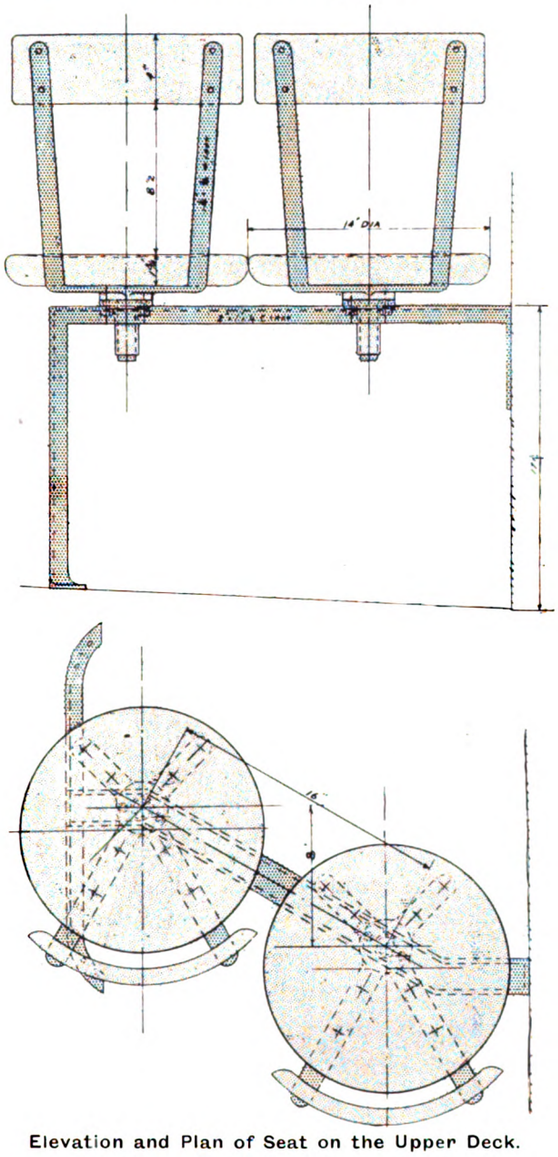
This exit, which is shown in the accompanying photographic view, is controlled by a gate and folding step operated by the motorman. The stair is moved forward close up to the dash in order to give headroom below the stair for passengers using the front exit. In order to give more room on the platform the ordinary brake handle has been dispensed with and a capstan wheel introduced with suitable gearing to operate the hand brake. Inside the body, the heel boards have been set back 2 in. on each side, giving more room for passengers and conductor moving about.



Elevation and Plan of Seat on the Upper Deck.

The drawings here reproduced show the new and interesting seating arrangement on the upper deck. Instead of two passengers sitting on a common seat which is barely long enough to accommodate both, each passenger is provided with an independent seat with back rest, mounted on a pivot, which allows it to be turned round to suit the direction in which the car is travelling. Each pair of seats is not in line as before, but is staggered to the extent of 8in., thereby allowing the shoulder of one passenger to overlap the shoulder of his neighbour. This arrangement considerably increases the width of the passage and, consequently, the comfort of the passengers. Details of the new seats, both in plan and elevation, are shown in the drawings, for which we are indebted to Mr. James Dalrymple, general manager of Glasgow Tramways.

AN IMPORTANT AUSTRALIAN DECISION.

Judgment for Tramway Authorities.

The mail from Adelaide which arrived in the end of November brought details of an important decision delivered by the High Court of Australia, on October 16 last, on applications by Adelaide Municipal Tramways Trust and Brisbane Tramway Company, to make absolute orders previously issued for prohibition against the enforcement of an award delivered by Mr. Justice Higgins in the Arbitration Court. The applicants contended that there had been no dispute, and that the award went beyond the powers and jurisdiction of the Commonwealth Arbitration Court. The High Court, in a series of elaborate deliverances, now made the orders for prohibition absolute.

The Chief Justice, who gave the leading judgment, said that if the present applications failed the control of the business of the two tramway authorities would be taken out of their hands for an indefinite period. The foundation of the award was that there was in existence an industrial dispute extending beyond one State, with which the Arbitration Court had jurisdiction to deal, and to which the respondents to the plaint, or some of them, were parties. Beyond the fact that they were all owners of tramways systems there was no connection of any kind between them, and the operations of the tramways system in one State had no effect, direct or indirect, upon those of the systems in any other State. The only bond of community was that they all owned tramways used for passenger traffic. In these circumstances it seemed to him to be *prima facie*, if not impossible, at least in the highest degree improbable, that a dispute between the employers and the employees in any one State as to the details of the conditions of employment should extend to any other. In this, as in many recent cases, the existence of the dispute depended upon the effect of sending to employers a log or schedule of claims. Such a log was sent on May 5 and September 8, 1911. No reply having been sent, the plaint was filed on October 26, 1911. Reviewing the complicated facts, he held that they proved the supposed association with branches in all the different States, was never formed, and that, in fact, the only registered organisation did not include these men, but the men belonging to the Victorian union alone. Consequently all action taken under the alleged rules, and all amendments made on them would be equally illegal and of no effect. The meeting of February, 1911, to frame a log, which the claimants referred to as a conference, was not a conference but an assemblage of individuals without authority to act. On the facts, he held that it was not an industrial dispute as meant by the Constitution and Arbitration Acts, but a mere claim for intervention of the Court put forward to settle claims made in the hope that the claimants would secure some advantage. This being the case, the Arbitration Court had no jurisdiction to consider the plaint. He held that the award of preference to the Brisbane unionists ordered was beyond jurisdiction, there being no dispute on the subject even in Brisbane, and also because the Industrial Peace Act of Queensland, prohibiting discrimination, was a bar.

Mr. Justice Barton, Mr. Justice Duffy, and Mr. Justice Rich concurred, while Mr. Justice Isaacs and Mr. Justice Powers dissented. By a majority the orders for prohibition were accordingly made absolute.

The litigation occupied about 100 days in the Commonwealth Arbitration Court and a number of weeks in applications and appeals in the High Court. The questions arising of course related solely to the Australian law of arbitration in trade disputes.

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THE
Tramway and Railway World

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LONDON, DECEMBER 10, 1914.

Motor Maintenance.

The abnormally severe conditions under which the average traction motor has to work call for much attention, and the problems connected with the repair of defective machines require a great deal of study. In the ordinary way, stationary motors driving machine tools, for instance, give extraordinarily little trouble, and go on running year in and year out with little attention. The traction motor, on the other hand, due principally to the vibration it has to endure, gives a fair amount of trouble, and all methods whereby delays on the road can be minimised by efficient maintenance of motors are worth consideration. Armatures burn out because of the breakdown of the insulation either between wires in the slot or between the coil and the armature core. Granted that the insulation in the first place was good, the cause of a breakdown may be either vibration due to a coil being loose in the slot, or deterioration through heat, or deterioration through local deposits of carbon dust. Obviously, when an armature is rewound, the coil should be a tight fit in the slot. This, however, is not enough to keep the coil tight, and it is strongly advisable that each armature, after having being rewound, should be varnished all over thoroughly and plentifully, and then baked in the oven until thoroughly dry. A considerable quantity of varnish gets down between the coils and the walls of the slot, and the result is somewhat similar to that obtained by solid impregnation. For tramway armatures and field coils, the use of double cotton-covered wire is almost universal, and where the motor is sufficiently powerful to do its work, its use is quite satisfactory. Many tramway cars are, however, somewhat underpowered, and the use of electrical braking has accentuated this trouble, as the motors have little time to cool. The result is that the motors of a car after a long day's run finish up at a temperature much in excess of what may be regarded as safe, and in consequence, the double cotton covering on the wire gradually carbonises and its insulating properties deteriorate. Some progress has been made in the use of enamelled wire for field coils, the enamel insulation being much more able to withstand high temperatures than the cotton. There are, however, several makes of wire on the market in which the insulation consists of asbestos or other heat resisting material, and it is claimed that the wire so insulated may be heated red hot within the covering without the insulation being destroyed. On a tramway undertaking on which the motors of the cars habitually finish up their day's work at too high a temperature, the use of such a wire would be well worth a trial. Accumulations of carbon dust inside motors can easily be dealt with under proper supervision and system of overhaul. Carbon dust accumulates in the ventilation ducts of the armature and in various other places, and unless cleared out gives rise to trouble. At definite regular intervals the motors should be dissembled, the armatures taken out, and the whole motor blown thoroughly out with clean compressed air. A regular and systematic blowing out repays itself very soon in a diminution of trouble on the road. Much has been said and written on the subject of undercutting mica on traction motor commutators, and the balance of opinion seems to be in favour of undercutting. By adopting this process, a very much softer grade of brush can be adopted, as it has no function to perform other than collecting current at the commutator. There is no need to use a brush hard enough to keep the mica down, and consequently, by using softer brushes, the life of the commutator is increased.

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Undercutting mica, however, makes it necessary that motors should be kept clean, and that the grooves out of which the mica has been cut are not allowed to get choked.

American Tramway Troubles.

During the last two or three years there has been a falling-off in the rate of extension of electric tramways in this country, for reasons which are well known. One is that existing needs have been largely supplied, and another that companies, owing to the terms of the purchase clause of the Tramways Act, are practically debarred from showing any energy of promotion. It appears that the slowing down of new construction in the United States, which has also been marked in recent times, has now reached a point comparable with the state of things in this country. The reasons, however, are different. To a great extent they are the same reasons which are preventing the development of steam railways in the States. The tramways and also the interurban electric railways in that country are, of course, owned by companies, and these companies—like the steam railway companies—are finding increasing difficulty in raising additional capital for extensions which are urgently needed in a great and growing country. Capital cannot be got because of State interference and restrictions. The State Commissioners have limited the rate of return on the capital of electric railways and other "public utilities" to 8 per cent., though in other businesses 10 to 20 per cent. is not considered unreasonable. The facts were well brought out in a presidential address to the recent Annual Convention of the American Electric Railway Association. Of course, the ordinary investor would be well satisfied with a guaranteed 8 per cent., but the fixing of that figure as a maximum is quite a different thing. The fact that many companies, in face of trade fluctuations and contingencies, must often be able to pay only very small dividends, or none at all, is a reason that in prosperous times they should be allowed to pay more than 8 per cent. if they can. One effect of the European War has been to throw the United States back on its own resources for new capital, and it is affirmed over there that the money will not be got till the 8 per cent. limit is removed. It is obvious that unless this strangling of private enterprise—no less effective than the "old iron" purchase price in this country—is stopped, the States will have to do without needed electric railway extensions. There is one other alternative, but we hardly look for that in America. It is railway nationalisation. Municipal working would be impracticable, as the systems extend over such large areas. But nationalisation would be even worse than municipalisation, from the point of view of energetic development.

Obstruction of Tramway Cars.

It is a curious fact that within the last few weeks there has been an increase in the number of cases of drivers of slow-moving vehicles obstructing tramcars. Yet for various reasons it might be supposed that if there was any change at all, it would have been in the opposite direction. In many districts, since the war broke out, there has been a sensible diminution in the number of vehicles on the streets, and also in the number of tramway cars. It is the more remarkable, therefore, that so many drivers of slow-moving vehicles still persist in wilfully obstructing the cars. The majority of such drivers are reasonable, and clear the tracks promptly on the approach of a car; but there are enough of the unintelligent and obstinate to cause great inconvenience to passengers. It is an unnecessary annoyance, and it would soon be suppressed if magistrates would inflict more severe penalties in cases where the proof is clear and there is no doubt about the culpable negligence of the offender. There are at least three points which should be dinned into the ears of all drivers of slow-moving vehicles. The first is that the tramway is constructed and worked under Act of Parliament, so that it has a supreme right to be where it is. Second, the statutory right carries with it the power to proceed against those who wilfully prevent the free passage of the cars. Third, great numbers of people are delayed in their journeys. Other evils arising from obstruction of the cars, such as loss of tramway revenue, would not appeal to the class of man who commits the offence, but perhaps a drilling in the first three facts mentioned might reduce trouble alike to the tramway authorities, the public, and the police.

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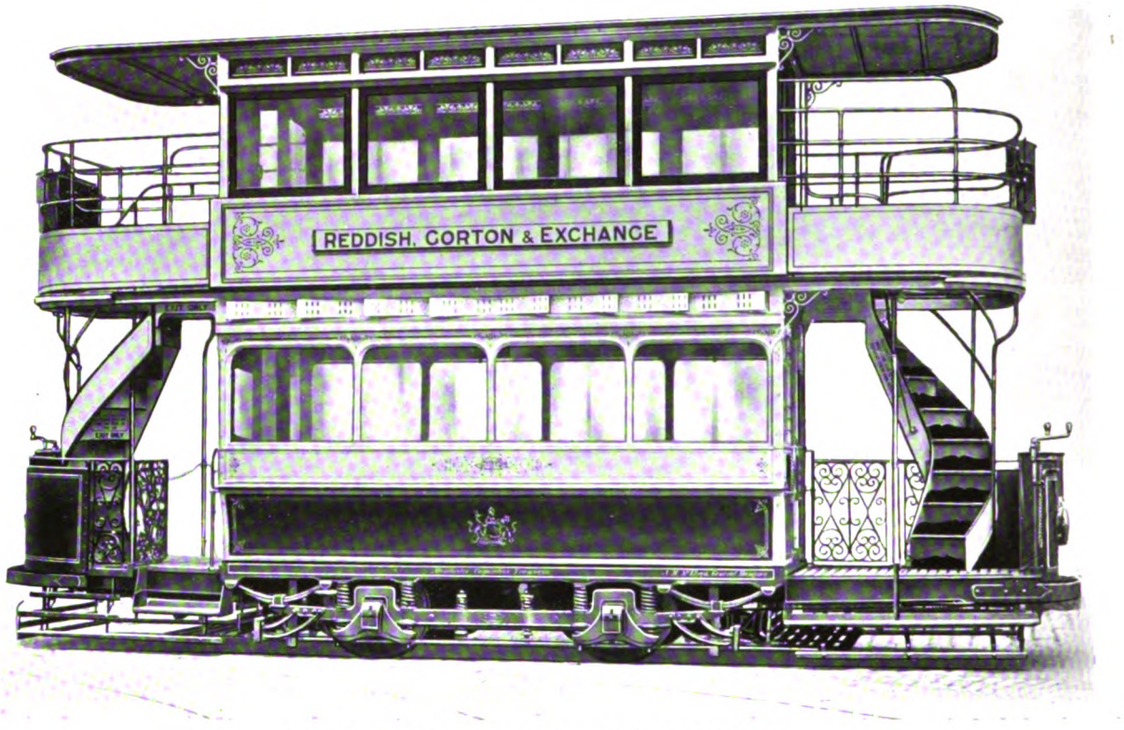
MANCHESTER CAR WITH FRONT EXIT.

Mr. J. M. McElroy, general manager of Manchester Corporation Tramways, has recently introduced a car so designed that passengers can alight on the near side at the driver's platform, and can enter on the same side, as usual, at the conductor's end. The object of the arrangement, which is shown very plainly in the accompanying illustration, is to minimize delays at stopping places, particularly at termini. In these columns we drew attention to the desirability of the improvement so long ago as 1906, when in our issue of April 5 of that year a car built in this way by the J. G. Brill Company for the Santiago tramways was described. From time to time since then we have frequently urged the advantages to be obtained from the design; but up to the present, with the exception of one or two cars at Huddersfield and Aberdeen, the idea had not been taken up, until Mr. Dalrymple introduced it in Glasgow, as described in this issue. It may be hoped that now more attention will be given to the unmistakable advantages which this comparatively simple change will confer. The Board of Trade for many years discouraged the use of both ends of the cars, because it seems to have been thought that their use would increase the danger of passengers in alighting at the driver's end of the car; though why this should be the case it is difficult to understand. A thorough study of the matter has, however, enabled the Board to look upon the arrangement with greater favour, and it is gratifying to learn that they have approved of the car now in service at Manchester. This car has been working for over two months, and it has, we gather, proved that the benefits expected can be fully realised, while no complaints have been received from the drivers. Clearly, the speed with which a car can be emptied and filled where passengers leave at one end of the car and enter at the other must be greatly increased, as compared with the common practice when all passengers have to leave before those wishing to enter can do so. Another great advantage is that it would encourage passengers to find seats as near the front or exit door as possible, instead of crowding the seats near the entrance, and so obstructing the passage of later comers. The waste of time entailed by the present arrangement is irritating to a busy man, and the delay to the cars is in the aggregate a serious loss to the undertaking. Every moment, in fact, that a car stands idle represents an appreciable loss in earning power; consequently every effort to cut out this waste ought to be made. From the point of view of safety the new car at Manchester should also prove a boon to the public, and thus indirectly to the tramway undertaking. The longer the time the car stands the greater the accumulation of people waiting to get in and the greater the danger of their being run down by road vehicles. This danger has been increased tenfold in these days of increasing motor traffic, as the records of coroners' courts show; and everything that reduces the time during which tramway passengers stand in the roadway will diminish the hazard which they run. If they are instructed when alighting at the front end of the car always to face towards the rear, so that they meet the general stream of traffic, accidents due to running down should be entirely avoided. It has been said that the double entrance was impracticable in cars with upper decks and circular staircases, but the Manchester car has both, and yet it has been found possible to provide the small entrance to the near side of the platform without in any other way interfering with the usual design of the car. Another safeguard as shown in the photograph is that the gate is closed at the conductor's end, thus preventing passengers from alighting on the offside. The Glasgow car, illustrated and described on a previous page, is, it will be seen, in many respects similar, as far as entrances go, to the one in Manchester. It is evidently a case of *les beaux esprits se rencontrent*. Managers who have not observed the working of a car with double entrances would, we think, find a visit for the purpose to Manchester or Glasgow by no means a waste of time.



Manchester Car with Exit at Driver's Platform.

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CORRESPONDENCE.

METHODS OF TRANSFORMING HIGH-TENSION ALTERNATING CURRENT INTO CONTINUOUS CURRENT.

To the Editor of The Tramway and Railway World.

Union Internationale de Tramways.—Abandoned Budapest Congress.

Dear Sir,—Arising out of the publication in your October issue of the reports as to the "Advantages and Disadvantages of the Various Methods of Transforming High-Tension Alternating Current into Continuous Current," I received a call from one of the joint managers of Messrs. Bruce Peebles and Company, who expressed an opinion that the article would be likely to do them some injustice, inasmuch as owing to the Congress being abandoned, no public discussion had taken place.

I suggested to Messrs. Bruce Peebles that any remarks they had to make should be put in the form of a letter to me, and I enclose copy of the same herewith.

In fairness to the Union Internationale de Tramways, I think it only right to state that the "views expressed by a small number of engineers" (Messrs. Bruce Peebles' letter) were obtained from the returns of 34 large concerns interested in the generation or distribution of electrical energy having a total capacity of 655,000 kilowatts.

As to the relative number and capacity of the converting machinery installed, it is a matter of regret that in numerous cases the numbers of each type of machine were not given, but from those that can be abstracted from the returns received, I find that the number and capacity are as follows:

Type.	No.	Total Capacity in Kilowatts.
Synchronous motor generator	137	77,000
Asynchronous motor generator ..	193	88,000
Rotary converters	193	99,000
Cascade converters	17	11,000

Yours truly,
Jas. Dalrymple,
General Manager.

Glasgow Corporation Tramways,
46, Bath Street, Glasgow,
November 13, 1914.

The following is the letter from Messrs. Bruce Peebles and Company, referred to by Mr. Dalrymple:

Dear Sir,

Motor Converters (or Cascade Converters).

(The Tramway and Railway World,
Issue 8th October, 1914, pp. 270 and 271.)

With reference to your conversation with the writer at your office last week, we now beg to confirm that the paper as printed appears to the ordinary reader as the considered opinion of your goodself and Mr. Goslin, instead of being merely a summation of the views expressed by a small number of engineers, and including only three who have motor converters installed.

The notes in the paper, together with the advantages and disadvantages therein given, are unfair to the motor converter and therefore to ourselves, since, as is well known, we hold the sole manufacturing rights for this type of plant in Great Britain, its Colonies, and Dependencies. The above, as you will readily admit, constitutes an injustice to us which we know you do not intend, and we thank you for your very kind promise to set this right, and so that you may do so we have pleasure in supplying you with the following information:

Advantages of the Motor Converter:

(1) It does not reverse its polarity.
(2) It possesses a good voltage regulation.
(3) It requires small floor space.
(4) It is easier to start than a rotary.
(5) It has an overload capacity as high as a rotary.
(6) It has a low temperature rise.
(7) It has a high power factor at all loads, this being entirely automatic, and therefore requiring no adjustment or attention.
(8) The brush gear is as simple as that of a motor generator.
(9) It does not flash over even on very heavy overloads.
(10) It will operate perfectly in parallel.
(11) It is an excellent three-wire balancer.
(12) It is absolutely reliable.

In substantiation of some of the above points, we enclose a copy of our Booklet No. 710, being a reprint of a paper read by Mr. J. W. Saaler before the South African Institute of Electrical Engineers in Johannesburg last year, together with the discussion which followed. This is particularly illuminating, and we have underlined in red ink some of the more important points which you will note fully support our contentions.

Disadvantages of the Motor Converter:

(1) Electrically it is as simple as a rotary, but not so simple as a motor generator.
(2) If with two bearings it is not so accessible as a rotary or a motor generator, but most converters are now made with three bearings.
(3) There is a remote possibility of the machine attaining double its normal speed, *i.e.*, running up to the synchronous speed of the alternating-current supply, *but this has never happened* even when the shunt of the direct-current side has been broken, and it can in any case be prevented by a simple speed-limiting device.
(4) While in every way suitable for 25 cycles, it is not commercial for such low periodicities owing to the fact that its synchronous speed is in inverse proportion to the sum of the number of poles on the alternating-current and direct-current sides, and consequently it is a low-speed, and therefore costly machine to manufacture.
(5) It has high tension on the stator winding, but not on any rotating part.
(6) If a voltage variation exceeding 25 per cent. is required, it is desirable to provide the machine with a synchronous booster to control the power factor. Below this range a booster is unnecessary, as the power factor variation is entirely automatic, and closely approximates to unity.
(7) The efficiency is slightly lower than that of a rotary.

In one portion of the report it is stated that cascade converters appear to have made but little headway, which we respectfully submit is an entirely incorrect and misleading statement in view of the fact that motor converters are installed in a large number of stations in this country, as you will readily see by reference to Lists 107, 108, and 110a, enclosed herewith, which give a note of the motor converters we have supplied during the years 1912, 1913, and 1914 (to the end of September). During last month we received the following orders:

Hull Corporation, one 500-kw. set.
Calcutta Electric Supply Corporation, four 200-kw. sets.
Messrs. Hadfields, Limited, Sheffield, two 500-kw. sets.
War Office (for Woolwich Arsenal), two 500-kw. sets.
Manchester Corporation, one 250-kw. set.

There is one point which we would specially emphasise and which is brought out very clearly in the enclosed lists, namely, the large number of repeat orders which are placed with us, thus proving conclusively, we think, that it is only necessary for an engineer to have actual experience of the operation of the motor converter to ensure his continuing the use of this type of machine.

We might further mention that a very large percentage of the total output of these works consists of motor converters, and that of the 50-cycle converting units ordered in this country during the last few years we have probably supplied more motor converters than any other single firm of rotary converter builders. These facts speak for themselves, and can readily be verified.

As your paper has been reprinted in The Tramway and Railway World, we would be glad if anything you may write could be published in that journal, so as to give the same publicity to it as was given to the article to which we have drawn your attention.

In conclusion, we would just like to express our indebtedness to you for the very kind way in which you have received our respectful protest, and again thank you for your kind promise to put this matter right. We are, dear sir, yours faithfully

(For Bruce Peebles and Company, Limited),
John H. Bunting, *Joint Manager.*

10th November, 1914.

OIL FUEL ON CHILIAN STATE RAILWAYS.

The Chilian Government has had under contemplation for some time the installation of oil-burning equipment on all the Government railways. Before doing so, however, it has decided to turn over one entire division of the Longitudinal Railway, which consists of about 125 miles, for exhaustive experiments. As there is every reason to believe, says the *South American Journal*, that the result of these experiments will result in the installation of oil-burning equipment on the entire system of Government railways, British manufacturers of this class of railroad material would do well to get in touch with the officials having charge of this work, as it will undoubtedly be quite an extensive field for the sale of this class of material.

Tramcar Lighting.—The British Thomson-Houston Company have issued a pamphlet describing a convenient combined switch and fuse for tramcar lighting circuits. In the 600-volt design the base and cover are of glazed porcelain, and for higher voltages a special moulded insulated material, and a cartridge fuse mounted in clips, which is easily replaceable, are employed.

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ECONOMICS OF ELECTRIC RAILWAY DISTRIBUTION.*

By Horace Field Parshall, D.Sc., M.Inst.C.E.

Practically all modern traction systems of the larger class are referable to the same class of power-house and transmission system, and these are not affected to any important extent by the sub-station arrangement, which is determined with reference to variations in the operating result occasioned by the spacing and the capacity of the individual sub-stations.

In the book by Mr. Hobart and the author on "Electric Railway Engineering," most of the problems entering into the design of electric railway installations have been dealt with. The question of the economic arrangement of sub-stations and the distribution conductors was not dealt with at length, because at the time the book was written sufficient operating data were not available to furnish a basis for different calculations. Such a wide difference of opinion existed between different engineers as to the cost of operating and maintaining a system of sub-stations that it did not appear advisable to treat the subject except on general lines. Since the publication of that book a great deal of experience has been gained, as a result of which engineers have come into more general agreement as regards sub-station practice. The present paper is written with a view to assist towards the standardisation of electric railway sub-station practice. Many years ago Lord Kelvin formulated a law as to the economic use of conductors in transmission systems. The number of independent variables when a complete system with sub-stations has to be dealt with is so great that the mathematical expression, from which might be deduced the minimum cost, would in practice be open to some suspicion. In this paper a complete balance sheet embodying every item has been worked out for each case, and the tabulated result is included as a part of the paper; hence, for different conditions it would be possible for an engineer to make the necessary corrections, so that, without any great amount of labour, the methods and results of the paper may be applied to practically any class of electric railway installation. The paper has not been extended to include the electric traction installations as a whole, since the process of standardisation in respect of motor equipments is still proceeding, and conclusions that might be drawn under present conditions would in another short time be incorrect.

With the given energy-consumption per unit of length of line that follows from a given train-movement, the capacity of the sub-stations increases directly with the distance between them. The energy-loss in distribution conductors of a given section varies with the cube of the distance between sub-stations. The cost of attendance is within wide limits independent of the size of the sub-station. The cost of the plant per kilowatt falls off with the size of the units, but the maintenance and renewals per kilowatt are more or less constant. The paper embodies a series of curves showing graphically the arrangements of sub-stations that will operate different train services on different electrical systems and at various voltages with a minimum total operating cost. With rotary-converter sub-stations and a working voltage of 600 volts, and for certain assumed average conditions of train-weight, speed, and energy-consumption, the most economical sub-station spacings are 8½, 5½, and 3¾ miles for train services of 6, 12, and 24 trains per hour, respectively. For a working voltage of 1,200 volts the sub-station spacings are 11, 7½, and 5 miles respectively, while when 2,400 volts is adopted the most economical sub-station spacings are 16, 12, and 8½ miles for the three train services respectively. Curves are also given illustrating the advantage gained by working at higher voltages, and these confirm the author's view that with the present arrangement of rotary-converter sub-stations there is little advantage in a higher voltage than 2,400 volts for the track conductor. The economy of higher voltages is shown to be approximately the same whatever the train service. As between 600 and 1,200 there is a saving of 14 per cent. in the total annual costs of the distribution system; as between 1,200 and 2,400 volts there is a further saving of 7 per cent., or 21 per cent. as between 600 and 2,400. If the working voltage is further increased to 3,600 volts, there is a decrease in total annual expenditure on sub-station and overhead conductor equipment of only 3 per cent., or less than the additional cost of the rolling stock.

For single-phase distribution at 5,000 volts the most economical sub-station spacings are 31, 24, and 16 miles for train services of two, three, and six trains per hour respectively. At 10,000 volts single-phase, the most economical sub-station spacings are 45, 34, and 26 miles for the same three train services respectively. With three-phase distribution at 5,000 volts the most economical distances between sub-stations are 38, 31, and 18 miles for the same respective train services. In most of these last cases, however, the economical distance between sub-stations thus determined is greater than would be permissible in practice from considerations of both traffic-operation and voltage-drop. Further, in the case of single-phase operation, the lower pressure of 5,000 volts is found to be the most economical for certain services, and the higher pressures of 10,000, 12,000, and 15,000 volts in vogue on the Continent are explained by considerations of voltage-drop

An appendix to the paper summarises the sub-station operating costs of the Central London Railway, which have been used to a large extent as a basis for the calculations embodied in the paper.

* Abstract of a paper read at the Institution of Civil Engineers on Nov. 17, 1914.

LINKING UP LONDON'S TRAMWAYS.

At the meeting of the London County Council on November 10 the Highways Committee presented a long report embodying their proposals for the linking up of various tramways and consolidation of the whole system. The committee recommended that application should be made in the Parliamentary session of 1915 for authority to carry out the linking up of certain termini. There are at present 22 inner terminal points and nine outer terminal points; but only 11 of these dead-ends were included in the scheme. The adoption of the improvements recommended would do away with the present termini or place them in more convenient positions, and would go far to remove a serious cause of street congestion and danger to the public.

In addition to the plans referred to, the committee proposed that steps should be taken for the reconstruction and electrification of tramways in Grange Road, Southwark Park Road, Raymouth Road, and Rotherhithe New Road. These lines, if electrified, would constitute an alternative route from London termini to Greenwich and Woolwich. The Council possessed authority under existing powers to reconstruct its horse tramways, but some modification would be necessary in the arrangement of the existing lines, and the committee thought it advisable to include the scheme in the Tramways Bill of 1915.

The total capital expenditure involved by the schemes recommended was £881,885, of which £787,035 was required for the construction of tramways and £94,850 for street widenings. The committee remarked that there might conceivably be criticisms in certain quarters at their action in bringing forward proposals of this magnitude in the present condition of tramway finance, but the financial side of the question had been prominently before them in determining the proposals to be put forward. Their recommendations, whilst framed with the view of reducing congestion and eliminating dead-ends, would, they believed result in a large addition to the revenue of the tramways owing to improved efficiency of working which would thus be secured. The plans embodied a comprehensive policy which aimed at what under existing conditions the committee regarded as a complete consolidation of the existing tramway system of London. The local authorities concerned had been consulted in regard to the proposals, and conferences have been held with their representatives. The Highways Committee regretted that some authorities had refused to confer with them. The committee hoped, however, in the circumstances under which the proposals are put forward, coupled with the strong views on the matter expressed by the Select Committee on Motor Traffic, which reported in 1913, that their suggestions would receive sympathetic consideration and that the necessary consents might be obtained. The committee regarded it of such importance to the Council to obtain the powers recommended that they advised that in the event of the consents under standing orders not being obtained, Parliament should be asked to suspend those orders in so far as might be necessary to secure consideration of the plans by a Committee of Parliament. In view of the conditions which have arisen as a result of the war, it was proposed that the bill should specify seven years as the period for the completion of the construction of the tramways.

Mr. G. H. Humb, chairman of the Highways Committee, explained that the scheme was the outcome of a complete survey and study of London, and had been submitted as a whole, with a view of perfecting the tramway system as far as possible. He left the matter entirely to the Council, the committee having done what they ought in submitting their recommendations.

Major Gray moved an amendment, deleting from the scheme all those proposed extensions which had not received the consent of the borough councils or road authorities. The amendment was carried, on a division, by 56 to 41. The schemes were then considered *seriatim*, and seven proposals were eliminated from the scheme, leaving the following for which powers are to be sought in the present session.

	Length. M. F. C.	System.	Cost. £
Seven Sisters Road to near Crouch Hill Station	1 5 0	Conduit	46,095
Charles Street to Charterhouse Street	0 1 5	Conduit	9,605
Mare Street to Terrace Road and Church Crescent	0 5 7 0 1 2	Overhead Conduit	26,930
High Street, Shoreditch, to Cambridge Road	2 0 4	Conduit	53,380
Aldgate to near Mark Lane Station	1 4 0	Conduit	41,180

Reconstruction of tramways in Southwark Park Road, Grange Road, Raymouth Road, and Rotherhithe New Road—three miles on conduit system, estimated cost, £74,709.

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MUNICIPAL TRAMWAYS ASSOCIATION.

Annual Meeting.

The annual meeting of the Municipal Tramways Association (Incorporated) was held in the Council Chamber of the Town Hall, Salford, on Friday, November 13. It will be remembered that the annual conference was to have taken place at Salford in September, but owing to the war it was thought advisable to abandon the conference for this year. This involved the postponement of the business meeting of the Association, which usually precedes the adjournment of the conference. In the circumstances the proceedings at the business meeting were largely formal.

Alderman H. Linsley, president of the Association, took the chair, and the following members of the Council were present, together with a number of members: Messrs. W. Clough (Bury), A. R. Fearnley (Sheffield), Alderman S. Flint (Leicester), T. B. Goodyer (Croydon), G. W. Holford (Salford), S. F. James (Ilkeston), J. M. McElroy (Manchester), H. Mozley (Burnley), Alderman J. H. Rodgers (Newcastle), and the hon. secretary, Mr. C. J. Spencer. The Mayor of Salford, Alderman A. Worsley, extended a hearty welcome to the members, and expressed regret that it had not been possible to hold the conference in Salford this year. The President briefly replied on behalf of the Association. After the minutes had been confirmed, the President expressed deep regret at the death a few weeks ago of Lieut. Brockman, R.N., a member of the Plymouth Corporation Tramways Committee, to whom the members were indebted for many attentions on the occasion of the meeting of the managers' section at Plymouth in July last.

The report of the Executive Council on the work for the past year, which is as follows, was then adopted.

REPORT OF THE EXECUTIVE COUNCIL.

The Executive Council beg to submit the following report on the work for the past year:

New Members and Resignations.

Since the last annual conference Keighley Corporation and Newport Corporation have joined the Association.

The following gentlemen have been admitted as members during the year:

F. Buckley,	general manager,	Corporation Tramways,		Wigan.
C. Clarke,	"	"	"	Birkenhead.
W. T. Charlton,	traffic manager,	"	"	Lancaster.
F. H. Corson,	general manager,	"	"	Gloucester.
T. Metcalf,	"	"	"	Swindon.
H. Webber	"	"	"	Keighley.

The following have resigned their membership during the year:

Colchester Corporation and Maidstone Corporation.

Managers.

A. S. Black, general manager and engineer, Corporation Tramways, Southport.

G. A. Bruce, general manager, Corporation Tramways, Lowestoft.

H. F. Street, general manager, Corporation Tramways, Southampton.

W. Wyld, general manager, Corporation Tramways, Birkenhead.

Appended is a summary of the members compared with previous year:

	1912-13.	1913-14.
Honorary members	1	1
Local authorities	75	75
Managers and assistants	109	111

Defects in Tramcar Controllers.

On December 2, 1913, the following communication was received from the Board of Trade with regard to tramcar controllers:

"Board of Trade (Railway Dept.),
"7, Whitehall Gardens, London, S.W.,
"*1st December, 1913.*

"Sir,—I am directed by the Board of Trade to state, for the information of your Association, that the attention of the department has been called to a source of danger which may arise in tramcar controllers.

"In the case of a recent accident, caused by a car getting out of control on a falling gradient, it was subsequenty discovered that the insulation of one of the controller leads had become chafed in such a way that if contact took place with an adjacent (No. 3) terminal at the bottom of the controller, a short circuit across both armatures would be created, and the magnetic brake would thereby be rendered inoperative. The ordinary tests made before the car was put into service failed to detect any such short circuit, but it was subsequently proved by trial on the ground that, owing to vibration or some other cause, contact did take place, with the result that a short circuit, of the nature mentioned above, was established.

"In these circumstances I am to request that your Association would be so good as to bring these facts to the notice of its members in order that the question may be considered whether special precautions should not be taken to preserve the insulation of controller leads at points where its failure might lead to dangers of the kind indicated above.

"I am, sir,
"Your obedient servant,
"W. F. Marwood.

"The Hon. Secretary,
"Municipal Tramways Association."

The matter was fully discussed by the Executive Council and a small sub-committee, comprising Mr. W. Clough, of Bury, and Mr. C. J. Spencer (honorary secretary), was appointed to confer with representatives of the Tramways and Light Railways Association and investigate the whole question of controllers and their connections so far as they concern brakes.

The Joint Committee met on several occasions and also interviewed representatives of controller manufacturers, who expressed their views as to the remedies for improving controllers so as to prevent a repetition of the trouble referred to in the communication from the Board of Trade.*

Motor Omnibus Competition—Metropolitan Area.

This matter has had the attention of the Council. A joint conference of representatives of tramway undertakings in the Metropolitan area was convened by the Executive Council, and held at the Waldorf Hotel, London, on January 16, 1914.

After a lengthy discussion the following resolution was passed, and subsequently copies were sent by the various authorities to the Prime Minister, President of the Board of Trade, President of the Local Government Board, and the Home Office:

"Resolved:

That this meeting of the Executive Council of The Municipal Tramways Association (Incorporated) and representatives of the Metropolitan Municipal Tramways assembled in conference is entirely in accord with the opinion expressed in the report of the Select Committee on Motor Traffic presented to the House of Commons, viz:

That all matter and duties relating to road and street traffic within the Metropolitan Police area, now dealt with by the Home Office, Local Government Board, or Board of Trade, including the confirming of bye-laws, should be transferred to and vested in a Special Traffic Department, to be constituted for the purpose as recommended by the Select Committee."

"That the conference is of opinion that legislative effect should be given to the remaining recommendations in the report of the Select Committee at the earliest possible moment."

A further meeting of the Metropolitan representatives is contemplated so soon as a convenient date can be fixed.

A bill intituled "London Street Traffic Bill," providing for the regulation of street traffic in London, has been drafted and ordered to be brought in the House by the following members: Mr. Dickinson, Mr. Shirley Benn, Mr. Carr-Gomm, Sir Stephen Collins, Mr. Goldsmith, Mr. Kellaway, Mr. Morison, Mr. William Pearce, Sir A. Spicer, and Mr. Wiles. Copies of the bill may be obtained from Messrs. Wyman and Sons, Ltd., 29, Breams Buildings, Fetter Lane, E.C., at a cost of 1½d.

Road Maintenance.

In accordance with the decision at the extraordinary general meeting held in London on June 18, 1913, when the following resolution was passed:

"That this extraordinary general meeting of the Municipal Tramways Association, held on Wednesday, 18 June, 1913, having had their attention drawn to a resolution of the County Councils' Association passed at a meeting held on Wednesday, April 24, 1913, suggesting that steps be taken to eliminate from private bills clauses proposing to give powers for the construction of trackless trolley systems, or the running of motor omnibuses within administrative county areas, desires to record its disagreement with such resolution and to point out that such action would have the effect of delaying local legislation for the provision of transit facilities by road vehicles in districts where such facilities are now urgently required and hereby instructs the Council of the Municipal Tramways Association to communicate with members of Parliament requesting them to watch this matter and to take such steps as will result in general and more equitable legislation with regard to the whole question of road maintenance."

A conference was convened by the Executive Council of the Municipal Tramways Association at the Town Hall, Manchester, on March 27, 1914, of representatives of towns that had bills in Parliament for motor omnibus or trackless trolley powers outside their own area, in order to discuss the position with regard to road maintenance clauses and consider the attitude to take up in connection with future legislation.

Legal representatives and others from Glasgow, Manchester, Sheffield, Birkenhead, and Walsall, attended and met the Executive Council, and the following resolution was passed:

"Resolved:

That this meeting agrees that efforts be made to have a conference with the President of the Local Government Board (Rt. Hon. H. Samuel, M.P.) if possible next week, in order to ascertain the position of the Government in regard to the question of maintenance of main roads, and that after such conference a further meeting be held of representatives of the towns interested."

In accordance with the resolution, the town clerk of Manchester communicated with the President of the Local Government Board, and received a reply to the effect that Mr. Samuel was not (having regard to various special circumstances) prepared to receive a deputation of representatives of local authorities on this matter.

A further conference was then called by the Executive Council and held on April 9, 1914, in the Town Hall, Manchester, when representatives attended from the following towns: Birkenhead, Glasgow, Manchester, Newcastle, Sheffield, and Walsall. The matter was considered, and the following resolution was passed:

"That this conference of representatives of municipal authorities who are promoting bills in the present session of Parliament, seeking powers (*inter alia*) for the running of motor omnibuses or trackless trolley vehicles in districts outside their own areas, while recognising the differing circumstances affecting each authority, suggests the following general principles for adoption by such municipal authorities, viz.:

* The Joint Committee's report is given on page 408.

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(1) That any claim by road authorities that their consent shall be necessary before motor omnibuses or trackless trolley vehicles can be run on the routes defined in the bills should be strongly resisted.
(2) That under no circumstances should a contribution towards road maintenance of more than ¾d. per car-mile be agreed to, and there should be power of review for the purpose of reducing any agreed contribution if in this session substantial grants are made by the Government towards the cost of road maintenance.
(3) That the claims of railway and canal companies for contribution towards the extra cost of strengthening the structure of bridges should be strongly opposed.
(4) That in the opinion of this conference equal terms and obligations should be imposed upon all owners of passenger-carrying vehicles, whether owned by local authorities or otherwise."

The Council regret to report, however, that notwithstanding the efforts of the respective authorities, provisions have been inserted in the whole of the bills that have been before the House this session for contributions towards road maintenance. A digest of the legislation in this connection during the last two sessions has been prepared and sent to each tramway undertaking.

The Council feel that this matter of road maintenance is at the present time in a very unsatisfactory state, but are pleased to note that the Government are proposing to appoint a Select Committee composed of members of both Houses to inquire fully into this matter and to take evidence thereon. The Council will watch the proceedings of this committee with considerable interest, and will seek an opportunity of officially putting before the committee, in the form of evidence, the views of the Municipal Tramways Association.

Meetings of Managers' Section.

Meetings of the managers' section were held in the Guildhall, Plymouth, on Thursday and Friday, June 11 and 12, 1914.

The following papers were read and submitted to the meeting:

	Subject.	*Introduced by*
1.	"Description of Plymouth Corporation Tramway System"	Mr. C. R. Everson (Plymouth).
2.	"Cost of Production of Electrical Energy for Traction Purposes"	Mr. J. F. Simpson (Preston).
3.	"Workmen's Return Tickets"	Mr. E. S. Rayner (Doncaster).
4.	"Self-contained Electrically-equipped Vehicles"	Mr. L. E. Harvey (Ilford).

Very useful and interesting discussions took place on these subjects, and the conference proved very successful. The Plymouth Corporation extended a hearty welcome to the delegates and kindly entertained them during their stay in Plymouth.

Slow-Moving Traffic.

The Executive Council have given this matter their consideration, and negotiations have taken place with various interested associations, but up to the present no special legislation has been framed restricting the position of slow-moving vehicles on the roadway.

The following letter was sent by the Automobile Association and Motor Union, to the various local authorities, with a view to their adopting the suggested draft by-laws referred to therein:

(Copy Letter and Suggested By-Laws.)

The Automobile Association and Motor Union.
Fanum House, Whitcomb St., Coventry St.,
London, *20th January, 1914.*

Slow-Moving Traffic.

The Association has had under consideration for some time past the increasing congestion of traffic upon the busy arterial thoroughfares of large towns, which is due to a considerable extent to the practice of heavy and slow-moving vehicles keeping to the crown of the road.

It has been clearly established by the recently published reports of the Select Committee on Motor Traffic and the Traffic Branch of the Board of Trade, that, apart from the monetary loss to commercial interests, congestion is the chief cause of accidents in town traffic, and in view of the importance of the matter to all users of the road, I am to enquire whether the Council will consider the desirability of taking such remedial measures as may be available to minimise the possibility of accident from this source.

The Council will be aware that section 78 of the Highways Act, 1835, contains certain powers which, if enforced, would, be of considerable assistance, but this section does not go far enough inasmuch as it only imposes an obligation to keep slow-moving vehicles on the near side of the road "for the purpose of allowing the free passage of other vehicles," thus leaving it open for the drivers of slow-moving vehicles to keep to the crown of the road until another vehicle is about to pass. This practice results in considerable obstruction and consequently increases the traffic congestion and the resultant possibility of accident.

In this connection it should be also mentioned that the Royal Commission on London Traffic in their report in 1905 stated that in their opinion if all vehicles proceeding at a slow or walking pace, were, in the absence of reasonable grounds to the contrary, compelled to keep as close as practicable to the kerb, this would materially relieve congestion by tending to separate fast and slow traffic.

In view of the foregoing, I am therefore desired to bring to your notice the two draft by-laws enclosed: (1) a by-law dealing with the question of keeping slow-moving vehicles to the near side of the road, and (2) a by-law concerning heavy vehicles which, by reason of their construction or weight, prevent the driver from being cognisant of the proximity of overtaking traffic.

There is, of course, the possibility that the Council have already made regulations to cope with the difficulties referred to, but in the alternative, it is hoped that they will see their way to frame by-laws dealing with this matter.

Lights on Vehicles.

I have also to bring to your notice the model by-law recently adopted by a large number of County Councils throughout the country. It is the view of the Association that regulations of this nature should be made as general in their application as possible, and if the provisions thereof are not already incorporated in the existing by-laws, I am to express the hope that your Council will give sympathetic consideration to the desirability of adopting such a by-law to be operative in the district within their jurisdiction.

(1). Draft by-law *re*

Slow-Moving Traffic.

Every person driving or being in charge of any vehicle which is moving at a slow pace in any street or part of a street mentioned in the schedule to this by-law, shall, as far as practicable, keep the same on the left or near side of the street and close to the kerb of the footway.

(2). Draft by-law *re*

Mirrors on Heavy Covered Vehicles.

No person shall drive or cause or permit any covered vehicle to be driven in any street or highway or road to which the public have access, unless such covered vehicle is provided with a mirror or efficient reflector of such adequate dimensions and so fixed as to afford to the driver thereof a view of vehicles, persons, or animals overtaking it from the rear.

"Covered vehicle" means and includes any vehicle to which the following statutory enactments apply, and to which any hood or cover shall be temporarily or permanently attached:

(*a*) Locomotives Act, 1898.
(*b*) Heavy Motor Car Order, 1904.
(*c*) Lights on Vehicles Act, 1907.

(3). Draft by-laws *re*

Rear Lights on Vehicles.

Every person who shall cause or permit any vehicle to be in any street, highway, or road, to which the public have access during the period between one hour after sunset and one hour before sunrise, besides complying with the requirements of the Lights on Vehicles Act, 1907, shall provide such vehicle either (*a*) with a lamp (or lamps) in proper working order and so constructed and capable of being so attached as when lighted to show to the rear a red light for a reasonable distance; or (*b*) with a reflector (or reflectors) at least 1½ in. wide, so constructed and capable of being so attached to such vehicle as to reflect a red light from a lamp carried by a vehicle approaching from behind. If only one lamp or reflector is provided it shall be placed on the off or right side of the vehicle, or if such vehicle is used for the purpose of drawing behind it any other vehicle or load on the right or off side of such other vehicle or load.

Every person driving or being in charge of such vehicles in any street, highway, or road to which the public have access during the period as aforesaid shall keep such lamp or lamps properly attached and properly trimmed and lighted or such reflector or reflectors properly attached and in such condition as to reflect a red light. The expression "vehicle" in these by-laws shall mean every machine or implement to which the Lights on Vehicles Act, 1907, applies.

A general interchange of views has taken place with representatives of various towns, and the Council have had the opinion of one of the hon. solicitors to the Association (Mr. S. F. James) on this matter. There appears to be a general effort throughout the country to exercise as far as possible the existing by-laws to deal with this subject. The Council will follow the proceedings with considerable interest, and seek an opportunity of putting forward their views.

An invitation was received from the Tramways and Light Railways Association, for two representatives to attend their annual congress at Newcastle on July 16 and 17, and the President (Alderman H. Linsley, J.P.) and Mr. G. W. Holford, Salford, attended as representatives of the Association.

Weekly Rest Day Bill, 1914.

Attention was drawn to this bill, and it was felt that as originally drafted it might seriously affect tramway undertakings. Instructions were therefore given to agents (Dyson and Company) to keep the Association fully posted as to its progress. On the bill coming on for second reading it was rejected, and no further action was necessary.

Standardisation of Tramway Rails.

The question of revising the design of the British Standard Tramway Rails has occupied several meetings of the sub-committee.

The sub-committee decided to recommend that the sections Nos. 1 and 5 of the standard series should be dropped, and that Nos. 2, 3, and 4 should be retained subject to a reduction in the width of the flanges from 7 in. to 6½ in., and to the head of the rail, whilst retaining its present coning of 1 in 21, having in addition a 12-in. radius.

The Panel Committee recommended, and the Standards Committee have adopted the recommendation, that two additional sections should be added in place of the two deleted, *i.e.*, a light rail specially adapted for interurban work, and a rail 112 lb. in place of No. 5, identical except as to weight, with No. 4, but with the web in a more central position. A further section was suggested by a member of the committee, and this is still under consideration.

The Standards Committee are now preparing to go into the matter of rail composition.

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The constitution of the Sub-Committee is as under:

*A. Ross, Esq., chairman.

W. Harper, Esq.
Charles F. Wike, Esq.
*R. J. Elford Esq.
— Nominated by the Institution of Municipal and County Engineers.

R. J. Howley, Esq.
Dr. H. F. Parshall.
*Stephen Sellon, Esq.
— Nominated by the Tramways and Light Railways Association.

*J. B. Hamilton, Esq.
J. M. McElroy, Esq.
C. J. Spencer, Esq.
— Nominated by the Municipal Tramways Association (Incorporated).

Fred. Bland, Esq., Edgar Allen and Company, Limited.
*P. B. Brown, Esq., Hadfield's Steel Foundry Company, Limited.
Percy S. J. Cooper, Esq., North Eastern Steel Company, Limited.
W. Howard-Smith, Esq.
*A. S. Keith, Esq., Walter Scott, Limited.
Geo. Ritchie, Esq., Bolckow, Vaughan, and Company, Limited.

* Members of Panel on Tramway Rails.

Tramcar Tires and Axles.

The constitution of the Panel on Tramcar Tires and Axles is as under:

A. L. C. Fell, chairman.

W. J. Armitage, Esq.	A. R. Fearnley, Esq.
D. Bain, Esq.	Albert Good, Esq.
G. J. Churchward, Esq.	R. J. Howley, Esq.
A. E. Collins, Esq.	H. J. Skelton, Esq.

The representatives on the Standards Committee have reported to the Council from time to time as to the work of the Sectional Committees to which they are attached. The Council are convinced that useful work is being done by the Standards Committee and they are therefore keeping well in touch with their activities.

Resistance of Steel Conductor Rails.

Some difficulty having arisen in the past owing to the existence of a certain amount of ambiguity in regard to the methods of specifying the resistance of conductor rails, this matter has been taken up by the Engineering Standards Committee and a satisfactory solution has been reached. The committee through their secretary asked the Council of the Municipal Tramways Association to nominate a representative to attend a conference of those interested, and Mr. A. L. C. Fell, chief officer of the London County Council Tramways, was duly nominated and attended in that capacity.

The report of the Engineering Standards Committee has now been published and can be obtained from any bookseller, or direct from the offices of the committee, 28, Victoria Street, Wesminster, London, S.W., at the price of 10s. 8d. post free.

Volume of Comparative Municipal Statistics.

At a conference of local authorities under the auspices of the London County Council, it was agreed that a volume of comparative municipal statistics should be compiled annually under the general editorship of the clerk of the London County Council (Sir Laurence Gomme). The honorary secretary of the Municipal Tramways Association communicated with the clerk of the London County Council suggesting that so far as municipal tramways were concerned the Municipal Tramways Association were the proper authority to assist in the compilation of statistical information. With this suggestion Sir Laurence Gomme agreed, and said he would be very pleased indeed to have whatever assistance the Association could afford him in his work. The Council are therefore interesting themselves in the proposed volume.

Rail Corrugation.

Several meetings have been held but no definite conclusions have been arrived at. The question of the investigation of synchronous and asynchronous vibration of rails, rolling stock, etc., has had special attention. It has been suggested that cinematograph records should be taken of a tramcar wheel running over a rail with the object of ascertaining if possible, the nature of the interaction between the wheel of the car and the rail over which it runs. This matter is at the moment under consideration by the Corrugation Committee.

It is with considerable regret that the Council have to report that it has been found necessary to abandon the Conference for this year, but the Council feel that, in view of the national crisis brought about by the European War, no other decision could be arrived at.

The Council desire to place on record their high appreciation of the valuable services rendered by the honorary secretary and treasurer, Mr. C. J. Spencer, in connection with the work of the Association. They fully recognise the great advantage to the Association in having the chief officer of a large municipal tramway system who is willing to give a good deal of his spare time in acting as the executive officer and in directing the work of the Association.

The Council would also like to take this opportunity of expressing their thanks for the valuable assistance which they have received from the Tramways Committee of the City of Bradford, by the existence of this arrangement and for the general facilities and help given in acquiescing in their general manager carrying out these duties. The arrangement is of great benefit to the whole municipal tramway industry of the country, the duties of the office being such that they can undoubtedly be more efficiently carried out by a chief officer who is actively engaged in the operation and supervision of an important municipal tramway system than in any other way.

The Executive Council are glad to be able to report that the finances of the Association are in a satisfactory state.

By order of the Executive Council,
H. Linsley, *President.*
C. J. Spencer, *Hon. Secretary and Treasurer.*

7, Hall Ings, Bradford.
September, 1914.

Mr. C. J. Spencer (hon. treasurer) submitted the statement of accounts and the balance sheet, together with the hon. auditor's report, which were adopted.

ELECTION OF COUNCIL AND OFFICERS.

On the motion of Mr. Henry Mozley, of Burnley, seconded by Mr. C. J. Spencer, of Bradford, the whole of the members of the Council and office bearers were elected *en bloc* for a further 12 months. The officers for the ensuing year are therefore as follows:

Executive Council, 1914-15.

President:
Alderman H. Linsley, J.P.
(chairman, Salford Corporation Tramways Committee).

Vice-President:
P. Fisher
(general manager, Dundee Corporation Tramways).

Past-Presidents:
A. R. Fearnley (general manager, Sheffield Corporation Tramways).
J. Dalrymple (general manager, Glasgow Corporation Tramways).
C. J. Spencer (general manager, Bradford Corporation Tramways).

Council:
A. Baker (*Past-President*) (general manager, Birmingham Corporation Tramways).
G. W. Holford (general manager, Salford Corporation Tramways).
W. Clough (general manager, Bury Corporation Tramways).
J. M. McElroy (*Past-President*) (general manager, Manchester Corporation Tramways).
A. L. C. Fell (*Past-President*) (chief officer, London County Council Tramways).
Alderman J. Miles, J.P. (chairman, Bolton Corporation Tramways Committee).
Alderman S. Flint, J.P. (chairman, Leicester Corporation Tramways Committee).
H. Mozley (general manager, Burnley Corporation Tramways).
T. B. Goodyer (general manager, Croydon Corporation Tramways).
Alderman J. H. Rodgers, J.P. (chairman, Newcastle Corporation Tramways Committee).
J. B. Hamilton (*Past-President*) (general manager, Leeds Corporation Tramways).
Alderman C. F. Spencer (chairman, Halifax Corporation Tramways Committee).

Hon. Solicitors:
E. R. Pickmere (town clerk, Liverpool).
S. F. James (town clerk, Ilkeston).

Hon. Secretary and Treasurer:
C. J. Spencer
(general manager, Bradford Corporation Tramways).

Mr. C. R. Everson (general manager of the Plymouth Corporation Tramways) said that Plymouth being a garrison town a large number of tramway men from different parts of the country were being sent there, and if the manager of any undertaking would notifiy him of any men who were coming to Plymouth, he would be pleased to arrange for them to fraternise with the Plymouth tramway men and also to see that they were well looked after.

Alderman J. H. Rodgers (chairman of the Newcastle Tramways) proposed a vote of thanks to the past, present, and future president of the Association. They had re-elected Alderman Linsley as their president, and they would visit Salford next year, when they hoped the war would be finished.

Mr. C. R. Everson seconded the resolution, which was put by the Vice-President (Mr. Peter Fisher), general manager of Dundee Corporation, and was carried by acclamation. The President briefly thanked the members for re-election and said he hoped that they would have the good fortune to receive the conference next year. Salford was an ancient and royal borough and knew how to treat its visitors and he assured them of a cordial reception. They had been quite prepared to hold the conference and, in fact, arrangements were actually made, but they had to be cancelled. In connection with the war, he was pleased to say that the employees of the municipal tramways in the country were taking a prominent part in the forces; upwards of 9,000 men were on service with the colours, which represented something like 15 per cent. of the men employed on municipal tramways.

Mr. J. F. Simpson (borough electrical engineer and tramways manager of Preston Corporation Tramways) alluded to a paragraph in the report expressing the appreciation of the Executive Council of the work of the honorary secretary, and he moved that the best thanks of the Association be tendered to Mr. Spencer for his services.

Mr. W. J. McCombe (general manager of Hull Corporation Tramways), seconding the resolution, said they all knew and esteemed the honorary secretary. He had proved a philosopher and friend to all of them, and was always willing to step into the breach when necessary.

The President, in putting the motion, said he endorsed everything that had been said of the honorary secretary He had been of very great assistance to him. The resolution was carried with acclamation.

Mr. Spencer briefly returned thanks and referred to the able assistance which he had received from Mr. Falkingham in connection with the work of the Association

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DEFECTS IN TRAMCAR CONTROLLERS.

A Report by a Special Joint Committee of the Tramways Associations.

The Board of Trade on December 1, 1913, addressed to the secretaries of the Municipal Tramways Association (Incorporated) and the Tramways and Light Railways Association, respectively, the following letter:

"Sir,—I am directed by the Board of Trade to state, for the information of your Association, that the attention of the Department has been called to a source of danger which may arise in tramcar controllers.

In the case of a recent accident, caused by a car getting out of control on a falling gradient, it was subsequently discovered that the insulation of one of the controller leads had become chafed in such a way that if contact took place with an adjacent (No. 3) terminal at the bottom of the controller, a short circuit across both armatures would be created, and the magnetic brake would thereby be rendered inoperative. The ordinary tests made before the car was put into service failed to detect any such short circuit, but it was subsequently proved by trial on the ground that, owing to vibration or some other cause, contact did take place, with the result that a short circuit, of the nature mentioned above, was established.

In these circumstances I am to request that your Association would be so good as to bring these facts to the notice of its members in order that the question may be considered whether special precautions should not be taken to preserve the insulation of controller leads at points where its failure might lead to dangers of the kind indicated above.

I am, sir, your obedient servant,

(Signed) W. F. Marwood."

The accident referred to in the above letter occurred on the London County Council Tramways system, the failure of a magnetic brake being due to the insulation of a field cable being chafed on a terminal from the blow-out coil at the bottom of the controller. An electrical contact was consequently established, and the effect was to short-circuit the motor armatures, which prevented current being generated for magnetic brake operation. The design of the controller concerned in this case is such that the magnetic brakes are operative when one motor is cut out.

This letter was considered at meetings of the Councils of the two Associations held in December, 1913, and a special Joint Committee, constituted as follows, was appointed to deal with the matter, and to report thereon.

Members of Special Joint Committee.

A. L. C. Fell, M.I.E.E., M.I.Mech.E., M.Inst.C.E. (chairman), chief officer, London County Council Tramways.

C. J. Spencer, A.M.I.E.E., general manager, Bradford Corporation Tramways.

W. Clough, general manager, Bury Corporation Tramways.

R. Humphries, engineer, Birmingham and Midland Tramways Joint Committee.

C. W. G. Little, M.I.E.E., electrical engineer, British Electrical Federation, Limited.

A. H. Pott, M.Inst.C.E., M.I.E.E., general manager and engineer, Metropolitan Electric Tramways, Limited, and London United Tramways, Limited.

A. de Turckheim, secretary.

The Special Joint Committee arranged for a circular letter to be sent to every member of the two Associations, asking for replies to the following questions:

1. State type, make, and number of controllers in use on your system.
2. Have you had any defects affecting the electric or magnetic brakes?
   - (*a*) In the wiring circuit.
   - (*b*) Due to the close proximity of the positive and negative conductors or terminals.
   - (*c*) Due to any other cause connected with the construction of the controller.
3. Have you adopted any precautions in connection with any such defects? If so, state their nature.
4. General remarks or suggestions.

The replies received were duly tabulated, and the manufacturers of the controllers referred to in the replies were invited to send representatives to discuss the design of their controllers. This was agreed to, and the representatives accordingly attended before the Joint Committee.

From the replies received to the enquiries it appears that the most serious faults which have occurred can be grouped as follows:

1. Faults which are liable to occur due to faulty design in the older patterns of controllers.
2. Faults which have occurred in controllers of modern design owing to the introduction of devices intended as extra precautions.
3. Faults which have occurred owing to lack of attention in the depots.

These three causes are dealt with *seriatim* hereunder:

(1) Faults which are Liable to Occur Due to Faulty Design in the Older Patterns of Controllers:

In some of these—

(*a*) The terminal boards are fitted in the lower part of the controller with terminals very close together, making it difficult to avoid overlapping of the cables leading thereto, and thus introducing a potential defect in the form of abrasion of the cable insulation.

(*b*) The positions of the notches on the controller are somewhat confusing in that similar positions of the main handle are used for both power and braking purposes.

(*c*) The cutting out of one motor from any cause whatever, whether voluntary or otherwise, renders the electric brake entirely inoperative.

(*d*) Difficulty is experienced in maintaining part of the brake circuit in a state of efficiency, as magnetic braking was not arranged for in the original design, and certain fingers and segments have had to be added for this purpose in spaces not sufficiently large to ensure the best possible insulation.

(2) Faults which have Occurred in Controllers of Modern Design Owing to the Introduction of Devices Intended as Extra Precautions.

There has been a tendency in so-called controller improvements to introduce additional contacts and connections for providing special devices such as run-back preventers, sanding arrangements, etc. These additional arrangements may, on some systems, be desirable, but the Joint Committee are of opinion that, where electric service braking is in use, the introduction of additional contacts and connections in the controller is undesirable and attended with considerable risk, and they recommend that further complications should not be added to controllers without very serious consideration.

To illustrate this point it may be mentioned that in one of the leading types of controller brought to the Joint Committee's notice there are 22 fingers on which an open circuit would cause failure of the magnetic brake against nine in the case of the controller not arranged for backward braking, etc.

(3) Faults which have Occurred Owing to Lack of Attention in the Depots.

Defects of various kinds have been reported which in the opinion of the Joint Committee are due to insufficient attention being given to proper maintenance. These defects cannot well be prevented by improvements in the mechanical or electrical features of the controllers, and the Joint Committee think that in some cases greater care and attention are the only practicable *remedy necessary for their elimination.*

Matters which Should Receive Attention.

Care should be taken in the lay-out of the cables in leading to the controllers, and these should be frequently and carefully inspected.

As proper contact between the fingers and cylinder segments depends upon the mechanical operation of the controllers, all wear in the handles, spindles, etc., should be taken up well before it has reached such a point as to endanger the proper operation of the contacts.

All terminals, finger bases, and other parts of the controllers fixed in proximity to cables should be free from sharp and irregular edges likely to cause trouble through abrasion of the cable insulation, and where such sharp edges are unavoidable suitable protection for the cables should be provided.

Institution of Electrical Engineers.—Sir John Snell's presidential address to the Institution of Electrical Engineers, on November 5, covered a wide range of subjects. Referring to the disbandment of the Industrial Committee, he said that, in his opinion there must be, apart from the Institution, separate bodies to deal with their own immediate and particular interests. The Institution must adopt a sympathetic attitude toward each and all of them, and be ready to help them or, if asked, to arbitrate between them. He expressed approval of the Institution's new model general conditions for contracts which, in his opinion, established a fair relationship between the purchaser, the contractor, and the engineer. As regards the remuneration of younger engineers, he was certain that there was serious cause for complaint from the younger electrical men, and he asked fellow-members as heads of departments to give, so far as was reasonable and proper, a preference to applicants who belonged to the Institution, and in fixing salaries not to think so much of recording a small fraction of a penny less per unit sold on the cost sheets, but to remember that the cost of living had gone up, and that the best cannot be expected from any man unless he is adequately paid. He also touched upon the national service, and mentioned that 500 members had offered their services. The response to the proposal that the Institutions of Electrical, Civil, and Mechanical Engineers should organise engineers' units for the Royal Naval Division had been so spontaneous that a corps was formed within a few days by men, not only of splendid physique, but also of highly-skilled intelligence. Legislation and the question of bulk and domestic supply, future charges to consumers, and capital investments in electrical works and the trend of improvement were also touched upon in the course of a very interesting address.

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THE AMERICAN ELECTRIC RAILWAY ASSOCIATIONS.

The thirty-third annual convention of the American Electric Railway Association and its allied bodies was held in Atlantic City, New Jersey, from October 12 to 16. According to the reports the proceedings were highly successful, except in one respect, namely, that the attendance of members was about one-third smaller than that at the convention of the previous year. It appears that the reduction was not due so much to a smaller number of companies and firms being represented as to the fact that many of them sent a smaller number of delegates. This is said to have been due to the general industrial condition, which has been greatly affected by the European War, and no doubt electric railway companies, like the steam railway companies, in the United States, are practising economy in every possible direction. The actual attendance was returned as 1,401 railway representatives and 1,011 manufacturers' representatives. These figures, reduced as they are, compared with the previous years, indicate the great size of the Associations, and the wide field from which the members are drawn. They also show how large a part the manufacturers take in the annual deliberations. The associations concerned, each of which has its own series of meetings, are the American Electric Railway Association (which is the parent body), the Transportation and Traffic Association, the Engineering Association, the Claims Association, and the Manufacturers' Association.

The General Situation.

The financial position in connection with electric railways (both street and interurban) in America was well summarised in the opening address of President Black to the Electric Railway Association. In this, he showed the troubles arising from the difficulty of raising additional capital and the causes of that difficulty. He said that since 1910 there had been a marked falling off in new construction, and a reluctance on the part of investors generally to place their money in electric railway securities. In a large measure this had been brought about through Governmental regulation. In other industries a rate of return ranging from 10 per cent. to 20 per cent. was not considered either remarkable or unreasonable, while in the case of public utilities the State Commissions generally had limited the rate of return to a maximum of 8 per cent., and this often on a depreciated valuation. The reasons given were based on the assumption that the business of a public utility was more stable and less subject to competition than other industries. Public utilities, however, were not entirely free from competition, and it was not true that they were not fully as subject to many other contingencies which might radically affect their income. A striking example was found in the inauguration of motor omnibus services in a number of cities, and these certainly for the time being materially affected the income of the street railways. Practically all public utilities were subject to radical changes in the art, making it necessary to discard large parts of the investment. Provision for this obsolescence could not possibly be made without setting up reserves far in excess of what would be permitted by any of the Commissions. Unless a rate of return was allowed commensurate with the risks involved and with the returns which could reasonably be expected from other lines of industry, it would be absolutely impossible to secure fresh capital either for extending present plants or for exploiting new ones. The European War had, of course, very largely increased the difficulties of securing fresh capital. The United States was still a debtor nation, as was shown by the recent course of exchange on London. The Americans must depend on American capital for future developments, but it would take more than the possibility of an 8 per cent. return to secure this capital. The task of the Association was to convince the public and the Commissions that these were facts, not theories, and that until they were recognised, no further development was possible.

Public Relations.

Perhaps one of the most important subjects brought before the Electric Railway Association was that of the relations between the public and the railway companies. The communication was a report by the Committee on Public Relations, and with the object of improving these relations the committee made a number of proposals which were adopted. Among them were the establishment under the auspices of the Association of a Bureau of Public Relations. The work of the bureau will cover the dissemination of information and literature on subjects of general importance to public service corporations, including particularly relations with employees, public relations, regulatory laws and commissions, publicity concerning facilities, service and accounts, rate making, depreciation and reserve accounts, taxation, and franchises. This contemplates close association between the bureau and member companies. The bureau will co-operate with similar committees of other public service associations, and it is also to influence the sources of public education by lectures, the formation of a committee of prominent technical educators to promote the teaching of correct principles on public service questions in American colleges, the formation of a similar committee in each of the great technical societies and of a similar committee to work in connection with the civic and economic societies, and discussions at institutions of learning on subjects pertinent to the relations between the public and service corporations. Further objects of the bureau are the publication in magazines of signed popular articles on public service questions by prominent workers in the electric railway industry, and newspaper advertising.

Among other subjects brought before the Association, either by papers read or by reports presented by committees, were courses of education for students, the organisation and function of a valuation staff, the aspects of workmen's compensation laws, electric railway securities from the companies' standpoint, and the cost of passenger transportation service. The last-mentioned was the report of a committee which is still engaged in collecting statistics on the subject from all over the United States.

Zone Fares.

In view of the practically universal use of a uniform fare for any distance on American street railways, the Association found much of interest in a paper on "A Zone System of Fares in Practice," presented by Mr. R. B. Stearns, assistant manager of the Milwaukee Electric Railway and Light Company. The zone system of graduated fares has been in operation for the best part of a year on the Milwaukee lines. The minimum fare, however, remains at five cents, and for each additional one-mile zone travelled there is a charge of two cents. The ticket system has, of course, been adopted. In the general conclusions of the paper, it was stated that suburban street railway traffic is not itself profitable, that the present community development of most American municipalities is such as to prevent the installation of a system of fares which will result in reasonable returns on suburban lines, and that the future profitableness of suburban lines must lie in the restriction of the allowable ride for a single fare, and the gradual application to the extended area of a zone system.

Transportation and Traffic Association.

This body discussed the subjects of rules, the construction of schedules and time tables, accident prevention, and many other subjects. Much of the matter was, of course, not applicable to conditions in Britain, and therefore only of secondary interest here. On the subject of accident prevention a committee reported that 35 companies had sent in data, from which it appeared that practical accident prevention was being accomplished through the installation of new and converted equipment, safety devices, and the education of employees. Reference was made to the "safety first" movement, which is now so wide spread.

Motor Omnibuses.

In a report by a committee on passenger traffic, it was stated that from data collected the committee had come to the conclusion that while the possibilities of the motor omnibus were very great, these possibilities would not be attained till further development had taken place which would decrease the operating cost, for the present high cost of operation and high rate of depreciation did not allow of sufficient earning capacity except under the most favourable conditions. In the cities the omnibus had not been a serious competitor to the street railway, and at the present time did not promise to be except in the larger cities where there were good pavements and level roadways, and where omnibus lines were allowed to parallel trolley lines and operate under most favourable conditions. As a feeder to the interurban railways, the motor omnibus offered possibilities, but when used for such service it must have the benefit of good roads, level highways, a well-populated territory, and sufficient equipment to secure reliability of service.

A report by a committee on fares and transfers, while not of special interest in Britain owing to the different system of fares, contained the following general statement which tramway managers here may note: "Your committee believes the prepayment system of car operation is firmly established, and that fare boxes also have come to stay. There is an almost general admission that fare boxes bring increased receipts, so this factor must be weighed against the original cost, the expense of upkeep, obsolescence, and the possible effect on accident records by adding to the conductor's duties."

A report by a committee on training of transportation employees concluded by saying that in such training the first desideratum was sustained interest in the work. Successive impulses had aroused temporary enthusiasm followed too often by lethargy. The controlling factor in these waves of alertness and inactivity was the failure fully to appreciate that nothing but the highest order of intelligence should be employed in the supervision of this detail of railroad work. The committee recommended, not higher pay for the training forces, but the employment for this purpose of higher grade men. The pay would be forthcoming on results produced.

Engineering Association.

Voluminous reports were submitted to the meetings of this Association. Progress towards standardisation was marked by a report from a committee on power distribution recommending various specifications for wires, cables, etc. The committee on electrolysis reported that they were continuing their study of the subject. Improved specifications for gears, wires, and cables for car equipment, steel wheels, and other things were discussed in a report by a committee on equipment. Many matters of detail were dealt with in the report of the committee on buildings and structures, while engineering accounting was dealt with in a report by a joint committee composed partly of representatives of the Accountants' Association. The proposals mainly related to the

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accounting for the carrying out of new work or specific jobs The committee on power generation split up various branches of the subject among sub-committees, and each of these latter made a separate report. On the subject of automatic stokers, it was said that the field narrowed down to chain grates for high-volatile high-ash coals, and to the gravity underfeed for practically all other classes. It was not certain but that the underfeed would eventually take the whole field. As to frequency in alternating-current systems, 60-cycle turbo-generators, transformers, and rotary converters were reliable, in most cases somewhat more efficient than 25-cycle, and cost slightly less. Therefore companies carrying light and power as well as railway load should, when it became necessary to increase the capacity of their systems, give most serious consideration to buying all their new apparatus of 60 cycles instead of 25 cycles.

ACCOUNTANTS' ASSOCIATION.

In the opening address to this Association, President Glover mentioned that though the Association had adopted a uniform classification of accounts less than one-third of the electric railways of the United States used the classification as it stood. In his opinion they should strive to secure the adoption of a uniform system of accounts by all State Commissions and by all companies. A number of papers on accounting were read, and a report from a joint committee on claims accounting was submitted. This gave a classification of accidents with instructions for its use. The accounting treatment of depreciation was dealt with in a long paper.

CLAIMS ASSOCIATION.

At the opening sitting President Web mentioned that unscrupulous politicians, utilising the anti-corporation feeling, had led public sentiment so far afield that in many cases it was not pursuing regulation but seeking for punishment. The people were fast adopting a double standard of dealing, one to be used for public service corporations, the other for individuals. This meant not only harsh legislation but the stimulation of unfair law-making and difficulty in effecting amicable and reasonable settlements. He urged that claims departments should deal fairly and equitably with those who had legitimate claims, but with an iron hand for "crooks."

FIRE HAZARD IN TURBO-GENERATORS.*

BY G. S. LAWLER

(Electrical Engineer, Inspection Department, Associated Factory Mutual Fire Insurance Companies, Boston, Mass., U.S.A.).

The chances of electric generators of the older types being seriously injured by fire in the event of some part of the insulation failing is slight. Occasionally arcing will ignite the insulation at some point, but it is seldom that the fire will spread much before it is extinguished. This freedom from fire damage is due principally to the comparatively low speeds, the accessibility of the combustible insulation, and the fact that the machines being of large mass per unit capacity, the insulation is considerably distributed.

This condition of practical freedom from fire is reversed in the case of generators of the turbo type, for when a short-circuit occurs in one of them there is a great chance that the insulation will be ignited and the machine be badly damaged; in fact, such damage has occurred in a number of instances.

The chief causes of the increased hazard in the more modern type generators are as follow:

(*a*) The volume occupied by this type of machine is very much less for the same capacity than that of the older types of generators, so that the conbustible insulation is more concentrated, and therefore much of it is exposed, even to a slight arc or fire. The covering on the conductors depends greatly for its insulating qualities on the presence of oils or gums of a highly combustible nature. The amount of this combustible insulation on the higher voltage generators is naturally greater than in the low voltage machines.

Owing to turbo-generators having only a few poles the end connections between slots form a large proportion of the total length of conductors, in fact in some designs approximately one-half of the coils are outside of the slots. These end connections, one-half being on one side of the machine and one-half on the other, are exposed to fire, and as with a pile of loosely laid sticks, fire will rapidly extend from the insulation on one coil to that on the others.

(*b*) Owing to these generators being of exceedingly large capacity in many instances (one of 30,000 K.V.A. capacity now being constructed), an enormous amount of energy is involved in a short-circuit, especially at the instant the short occurs, and as the arc is confined in the limited space with the combustible insulation it would seem impossible for the insulation to escape being set on fire at many points simultaneously.

(*c*) The machines are cooled by forcing large quantities of air through the spaces between the conductors. The large and constantly renewed supply of oxygen will hasten combustion when it is once started. The air is given somewhat of a rotary motion by the rapidly revolving rotor, which has the ventilating vanes on it, and consequently fire when started will be quickly swept around the exposed insulation.

(*d*) The generators are totally encased with the exception of the air inlets and outlets, and even these in some designs are under the machines. This construction prevents access to a fire, and much valuable time will necessarily be consumed before extinguishing agents can be used effectively. When the field current is cut off, as is necessary in case of short-circuit, the only means of bringing the rotor quickly to rest is lost, and it will continue to run for a long time after the steam has been shut off. Some machines will run for over an hour. This continued rotation is not conducive to the quick extinguishing of fire, especially when the ventilating vanes are mounted on the rotor.

In addition to the possible causes of arcing existing in the case of the older types of generators, the turbo-generator is subject to momentary large current rush at instant of short-circuit, even if the short is external to the machine itself, unless means are taken to keep the current within safe limits. The heavy rush of current causes mechanical stresses in the conductors, which in some cases are severe enough to distort the conductors, especially where outside the slots, and to injure the insulating covering, resulting in a short circuit within the generator itself. In some designs the internal reactance of the machines will permit of the momentary current rush amounting to 40, or possibly more, times the normal full-load current of the machines.

The possibility of the conductors being distorted has been reduced in some cases by designing generators with sufficient internal reactance, or by providing external reactance such that the current at the moment of short circuit will not be great enough to damage the generators. Attention has also been given to supporting the stator end connections to prevent their distortion. These means have undoubtedly greatly increased the safety of the turbo type of generator from possibilities of internal short-circuit, but in no way tend to prevent a fire resulting should an arc occur. A short-circuit in the rotor will probably not result in a severe fire unless under exceptional conditions. This is also true if the short-circuit occurs inside of a stator slot. A short-circuit involving a stator coil, however, is more apt to occur at the end of the slot where the conductors are exposed. As asbestos is now used largely for insulating the rotor windings, and as these windings are well protected, it is probable that only in cases of severe fire in a machine will the rotor windings be damaged to any extent.

Generators of the turbo type are of such recent production that none of them have yet reached a life which could be considered old, and, therefore, the troubles which can be expected near the end of their life by fire have still to come. Undoubtedly the manufacturing companies have given serious thought to the matter of the reduction of the fire hazard in turbo-generators, and have employed all means practical at the present time to this end, but there is still very much to be desired. The following several means if taken together would seem to minimise the chances of a serious fire:

(*a*) If a suitable material could be found a non-combustible outer covering could be placed over the insulation on the stator end connections. This would greatly delay the spread of fire, and, even if no other protective means were taken, would undoubtedly prevent much serious damage. Where fire extinguishers were used the covering would at least hold back the fire until they could be brought into play. At present no material suitable for such a covering appears to be available.

(*b*) If a non-combustible outer covering should be put on, its advantages would be partially lost in time unless the cooling air were freed of the dirt and oily vapour liable to be in it. This could be done by filtering, as has already been advocated several times.

(*c*) Means could be provided for cutting off the air supply in case of fire in generators by placing dampers in the inlet ducts designed so as to be normally held open by fusible links. The links could be placed so that they would be quickly fused by the heat and allow the dampers to close automatically. By reducing the oxygen supply to that entering by leakage the action of the fire would be slow.

(*d*) Arrangements could be provided for the quick introduction of carbon dioxide gas into the machines. The carbon dioxide could be kept in liquid form and piped through valves, expansion tanks, etc., to the generators. The valves could be arranged to be opened by the closing of the air inlet dampers so that the gas would be automatically introduced into the generators. This gas would be very effective in extinguishing fires inside the machines after the air supply had been cut off.

The employment of some efficient method of reducing the fire hazard in generators of the turbo type, either along the lines mentioned or in some other way, is important. The value of these generators is great, and the damage by fire may amount to a considerable proportion of the first cost. It is probable that the damage is more liable to occur towards the end of the life of the generators, but even then the loss may be large, both directly and indirectly. The large central stations have reserve units so that the increased damage due to fire in one of their generators would probably not affect the continuity of service, but the increased time necessary for repairs may be long, and during this time the reserve capacity will be weakened. In the case of industrial plants, the longer time needed for repairs might be serious. Many manufacturing concerns who generate their own current depend on only one unit and, therefore, their whole production, or a large part of it, would be affected.

* Abstracts from paper read before the American Society of Mechanical Engineers.

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THE PURCHASE OF BRISTOL TRAMWAYS.

MR. ALFRED DICKINSON'S ESTIMATE OF AWARD UNDER THE "THEN VALUE" CLAUSE.

The opposition in Bristol to the scheme of the Corporation for the purchase of the tramway undertaking of the Bristol Tramway and Carriage Company is gathering strength. It will be remembered that the Corporation obtained an Act in the last session of Parliament, giving them power to work the undertaking when purchased. Messrs. E. Gerrish, Harris, and Company, who acted for the petitioners against the bill when it was before the House of Commons, have sent a letter dated October 29 to the petitioners. In this letter it is stated that "disregarding the doubtful character of the speculation and the impossibility of raising money except upon most onerous terms, the municipal trading party in the Council still intend to try and force a purchase on the city. It is necessary, therefore, to be prepared to continue to offer the strongest possible opposition, and with this object an influential committee is being formed consisting of those owners and ratepayers who petitioned against the bill and also a number of other important ratepayers whose signatures to the petition it was not possible to obtain in the short time available."

Appended to this letter is a report by Mr. Alfred Dickinson, the expert who was retained on behalf of the opposition to the bill. In this report he says that his experience shows that the 43rd section of the Tramways Act, 1870, is not so advantageous to the purchasing local authorities as an actual reading of the clause would seem to imply. The principle laid down in section 43 is that the purchasing authorities have the right to acquire the tramways on their "then value." Taking as an example the power-station of the Bristol Tramways Company, which was built in 1900, Mr. Dickinson points out that the plant consists of slow-speed, compound, vertical, condensing engines, direct coupled to generators. When installed this was a most up-to-date plant, but modern invention has superseded this type of plant by turbo-generators. These are now the practice, and horse-power for horse-power cost, say, one-half of that of the plant of the Bristol tramways. Notwithstanding this fact, if the Corporation acquire the undertaking the price which will have to be paid is what it would cost to instal the identical original plant now in the power-station. As the type of plant installed is not now being manufactured, to put it in at the present time would cost more than it did originally. The increased cost may very well equal the depreciation on the plant, so, if the Corporation acquire the tramways, they will have to take over a power-station at a cost largely exceeding the present cost of installing a power-station equipped with modern plant.

Mr. Dickinson is satisfied that the undertaking has been maintained in a most thorough manner. That being so, the depreciation is small; therefore, coupled with the fact that the cost of installation now would be very high owing to the present price of labour and materials, an award must be for a very large sum. Having examined all the circumstances, he is of opinion that the award will be approximately £1,215,000. The sum required to pay off that amount in 25 years on the basis of the 3½ per cent. table is £31,193. Interest, also, will have to be paid, and taking the most favourable view and assuming the Corporation's own figure of 3·9 per cent., the annual charge for interest would be £47,385, making with the sinking fund £78,578. With the traffic available in Bristol, such an annual charge would, under the most favourable circumstances, be serious, but with an extensive, efficient, and increasing motor omnibus competition the profits on the working of the tramways would be insufficient to meet it.

The tramways are efficiently and economically worked at present, and Mr. Dickinson is satisfied that if they were purchased and worked by the Corporation the revenue could not be increased nor could a better service be given, nor the tramways worked at less cost than at present. Having examined the figures available and made allowance for revenue and expenditure on the motor omnibus part of the company's undertaking, Mr. Dickinson arrives at an annual deficit of £26,839, without making any provision for depreciation. He next takes into view the effects of motor omnibus competition, and assuming that it reduces the traffic receipts of the tramways only to the extent of 10 per cent., the position would be as follows:

	£	£
Gross earnings of tramways	225,556	
Less 10 per cent. due to motor 'bus competition ...	22,555	
		203,001
Working expenses		173,817
Available balance		29,184
Sinking fund and interest on £1,215,000		78,578
Deficit (without having made any provision for depreciation)		49,394

Advocates of purchase may suggest that the estimate of present value put forward by the advisers of the Corporation, viz., £670,000, is the more correct figure to take as a basis of the results to be anticipated.

Adopting this figure of estimated value for the moment, the financial position would be as follows:

	£	£
Gross earnings of tramways	225,556	
Less 10 per cent. due to motor 'bus competition ..	22,555	
		203,001
Working expenses		173,817
Available balance		29,184
Sinking fund and interest on £670,000 on same basis as previously taken		44,001
Deficit (without having made any provision for depreciation)		14,817

The before-mentioned deficits of £26,839, £49,394, or £14,817, as the case may be, will have to be provided out of the city rates, and a 1d. rate in Bristol produces about £7,000.

There is no case where a local authority has purchased such a complete, splendidly-equipped, and thoroughly-maintained electric tramway as is the Bristol system. And Mr. Dickinson knows of no case of any local authority having purchased a tramway undertaking where there was already an organised system of motor omnibuses owned and worked by the tramway company.

Having regard to the great probability that the figure of capital cost assumed by the Corporation for the acquisition of the tramways will be largely exceeded, that the working expenses will be higher than put forward, that with motor 'bus competition the revenue would be decreased, and to the possibility of further improvements in motor omnibus traction, it is his opinion that the Corporation would be well advised in postponing the exercise of their option of purchase.

This course has the merit of avoiding immediate losses, and will enable the Corporation to judge the effect of probable developments of other forms of street traction upon the future of electric tramways.

Mr. H. F. Cooper, secretary of the Bristol Tramway and Carriage Company, has written to the local press, stating that his directors have read Mr. Dickinson's report, and have considered that his approximate estimate of the value of the company's undertaking by no means represents the true value. The company's advisers placed the value at a sum exceeding by some hundreds of thousands of pounds Mr. Dickinson's value of £1,215,000.

MANUAL OF ELECTRICAL UNDERTAKINGS.*

This, the 18th volume of this invaluable manual, has been, as from the beginning, compiled under the direction of Mr. Emile Garcke, and the electrical undertakings' capital during that period has grown from nearly £61,110,000 to over £458,762,000. Owing to careful editing the size of the work has fortunately not increased in proportion, although the information given has improved in quality and arrangement with each edition. This information is classified into seven sections, all arranged in alphabetical order and including electrical undertakings in Africa, America (North and Central), Australasia, and our possessions in Europe and Asia, and many special subjects. A further section devoted to "The Progress of the Year" is full of statistics and of general information. There are also summaries of the industry as chronicled in previous volumes under the headings "Electric Power and Supply," "Traction," "Telegraph," and "Telephone." The directory of officials contains no less than 20,000 names and addresses, and the number of advertisers enumerated in the "Buyers' directory" is an unfailing index of the usefulness and popularity of the work. The usual maps, over 50 in number, are given, the whole being a monument to the skill and industry of the compilers who have produced for so many years this indispensable aid to all those interested in electrical enterprise.

Electric Traction in Osaka.—A British Consular report states that there are now 250 miles of double-track electric lines in operation within a radius of 50 miles of Osaka, and that a further 80 miles of line are under construction. The district appears to be suffering from the lack of means of communication, and as soon as the financial stringency is relaxed, no doubt large extensions will be put in hand.

Simpson Patent Too-Cam Brake Attachment. — This apparatus, which has now been on the market for some time, is rapidly gaining favour. It is in use on many important systems, among which are the following corporation tramways: Oldham, Leicester, Glasgow, Wallasey, and Preston, and other systems in this country and many foreign tramways, and is giving every satisfaction. The sole selling and manufacturing rights have now been obtained by the Anger Manufacturing and Supply Company, Limited, the manufacturers of the Anger improved automatic brake adjusters, and other tramway supplies and specialities whose registered offices are in the Bank Chambers, Preston. This company has recently improved this too-cam brake, giving the cam an extension so that the chain cannot overrun. A sample set can be obtained for trial without expense upon request to the Anger Company.

* Vol. XVIII., 1914-1915. 1,872 and cxcvi pp. 8¾ in. by 6 in. by 3 in. 21s. net. (Electric Press, Limited, Fisher Street, Southampton Row, W.C.)

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FINANCIAL REPORTS AND MEETINGS.

The City of Buenos Ayres Tramways (1904) have declared the usual quarterly dividend of 1¼ per cent.

Brisbane Electric Tramways Investment Company notify an interim dividend at the rate of 8 per cent. per annum on the ordinary shares for the past half-year.

Electric Construction Company.—An interim dividend at the rate of 7 per cent. per annum on the preference shares for the half-year ended September 30 was paid on November 30.

Lancaster and District Tramways Company.—Receipts for the past year show a decrease of £1,027. The gross profits were £1,134, and after paying interest on loans, amounting to £831, there remains an adverse balance of £1,502.

The Edison and Swan United Electric Light Company's Report for the year ended June 30 states that there is a net profit of £4,696. This, added to £1,036 brought forward, makes a total profit of £5,732, which the directors propose to carry forward. Taking the business as a whole, the directors state that very considerable expansion has taken place during the past year.

Scarborough Central Tramways Company.—The directors' report for the year ended October 31st, 1914, mentioned that up to the end of July the season was very promising, but since the war commenced the receipts had fallen off very considerably. The directors recommended a dividend of 4s. per share, after payment of £100 in further reduction of the mortgage debentures, carrying forward a balance of £70 8s. 5d.

Provincial Tramways Company.—The final dividend of 10d. per share on the ordinary shares, makes with the interim dividend paid in June 1s. 6d. per share on the ordinary shares, 7½ per cent. per annum for the year ended September 30. The directors have set aside £12,000 for reserve and depreciation and £2,000 as a reserve for third-party insurance or for other purposes. The amount to be carried forward will be about £4,935.

Morecambe Tramways Company.—The annual meeting of this company was held in Morecambe on November 28, when accounts were presented showing a disposable balance of £916, out of which the directors proposed a dividend of 2 per cent., absorbing £330, and allowances of depreciation on rolling stock, £360, and on the track of £150, leaving £76 to carry forward. Mr. W. H. Pickles, who presided, said that in view of the circumstances the result of the year's working must be regarded as fairly satisfactory. After the declaration of war the receipts fell off very considerably, and for three months showed a reduction of 21 per cent. The motion for the adoption of the report was agreed to, and Mr. G. H. Petty, manager and secretary of the company, said that they were fortunate to be able to pay a dividend at all. He was afraid they must not expect too much from next year's working. The staple trade of Lancaster was very much disorganised, and the earning power of the people was greatly reduced. Until something like normal conditions prevailed he was afraid they could not expect a very great amount of money coming into Morecambe.

Newcastle-on-Tyne.—At the annual meeting of the Newcastle Tramways Committee, held on November 25, Alderman J. H. Rodgers, who was re-elected chairman, made a review of the results of working the tramways during the six months ended September 30. In that period, he said, the cars carried 31,043,032 passengers, showing an increase of 3,044,133 over the corresponding six months of last year. The gross traffic receipts were £136,858, an increase of £13,852. The miscellaneous receipts brought up the total revenue for the period to £142,066, an increase of £14,322. The total expenses amounted to £80,179, an increase of £6,912. Part of the increase was due to concessions granted to the men. After allowing for capital charges, income tax, etc., there was a surplus of £17,522, compared with £16,820. Out of this net surplus they contributed to the rates £9,000 against £6,000 in the corresponding half-year. Their contribution to the Tyneside Company had been £5,435, against £4,158. The figures were perfectly satisfactory, but there was no margin for any concessions. It would take all the profits of the next half-year to keep up the reserve fund to its full amount of £100,000.

Bournemouth Tramways.—The report of the general manager, Mr. I. Bulfin, on the working of the tramways for the six months ended September 30, 1914, stated that the receipts were very satisfactory up to August 1, showing an increase on the previous year of £1,850. The outlook for August and September was very promising, as 10 new cars were ready for service. The declaration of war, however, had seriously affected Bournemouth, as the London and South Western Railway was practically commandeered by the Government for the transport of troops, and no excursion trains were run from August 1 to September 1. In addition to these drawbacks, 120 men, representing more than 25 per cent. of the staff, joined the colours. Immediate steps were taken to reduce the services on all routes, and the decrease in receipts was thus met by a decrease in expenses. The very generous action of the committee in granting half-pay to the men during their absence with the colours will represent an increase in expenses of about £450. Contracts, such as coal, etc., depending on war clauses were at once annulled, but by prompt action and knowledge of the market and supplies, satisfactory arrangements were made at very slight increase in cost. The working expenses given (£31,648 18s. 5d.) include the extra cost of all materials due to the war, the sum of £450 paid to the men who joined the colours, and the concession of 56 to 54 hours per week; yet, in spite of these extras, the expenses show a decrease of over £1,000 on last year's period. The gross balance works out at £25,647 2s. 4d., as against £28,344 12s. 10½d., being a decrease of some £2,700 on last year's figures. Although there will be increased capital charges to be made for the present year, Mr. Bulfin anticipates that the year's balance sheet will show a substantial profit.

Walthamstow Council Tramways.—The tramways manager, Mr. William Murray, in his report for the year ended March 31, says that although the loss of business experienced in 1912-13 was more than recovered, more passengers being carried, and more money taken than ever before, the financial result was worse than in any other year in the history of the undertaking except the first, when there was a loss of £5,575. Last year the net loss amounted to £4,357. Interest, repayment of loans, maintenance of permanent way, upkeep of rolling stock, and the cost of electrical energy have all been higher than the previous year. To the loss has been added the sum of £3,378, the cost of superseded work. Mr. Murray urges that the whole of the tramway-owning authorities in Greater London should unite in a determined and persistent agitation that the burden of road maintenance should be equally borne by competitive undertakings. Pressure should also be exercised for the making of regulations requiring all slow-moving traffic to keep to the sides of the road. Regulations of this kind have been enforced elsewhere, and have met with marked success. Mr. Murray says that he sees no reason why they should not be adopted in the Metropolitan area also. The traffic revenue amounted to £38,589, as against £37,191 in 1912-13, an increase of £1,398. Considering that during four of the best months of the year the whole service was more or less upset by the alterations being made to the permanent way, the result is regarded as very satisfactory. The average receipts per car-mile were 7·94d., as against 7·76d. The number of passengers, which was 12,579,852, shows an increase of 772,303. The energy consumption for traction purposes was 1,496,462 units, an increase of 69,422 units over the previous 12 months, and the amount paid for it to the Electricity Department was £8,567, as against £8,175 in 1913. The energy consumption per car-mile amounted to 1·28 units. The capital account stands at £188,192, and the total track length is 13·5 miles. The rolling stock now totals 38 cars.

East India Tramways Company.—The Simplex petrol tramway cars by which the service of this company is provided continue to prove very satisfactory. In their report for the year ended July 31, 1914, the directors recommend the payment of a dividend of 5 per cent. on the cumulative preference and ordinary shares, and of 10 per cent. on the deferred shares. An interim dividend of 2½ per cent. was paid on the preference and ordinary shares on May 31, 1914. This compares with a dividend of 5 per cent. a year ago. The following is a summary of the accounts:

	1913-14.	1912-13.	Inc. or Dec.
	£	£	£
Gross receipts	24,004	22,472	+ 1,532
Working expenses	15,142	12,758	+ 2,384
Net receipts	8,862	9,714	− 852
Reserve account	2,000	6,141	− 4,141
	6,862	3,573	+ 3,289
Brought forward from previous year	204	176	+ 28
Balance available for dividend	7,066	3,749	+ 3,317
Total amount of dividends paid	7,045	3,545	+ 3,500
Balance carried forward	21	204	− 183

The increase in expenses is accounted for by the increased cost of petrol and materials, increased wages, and by loss upon the running of road vehicles. The tramcar mileage amounted to 604,804 miles, and that of the road motor vehicles to 16,863. The number of passengers carried by tramcars was 5,904,937, and by road motor vehicles, 140,272. The average earnings per passenger were ·95d. The total running expenses of the tramcars were 4·12d., made up as follows: Traffic expenses, drivers, inspectors, etc., ·96d.; petrol and lubricating oil, 1·20d.; repairs and maintenance, 1·13d.; depreciation, ·83d. The total running expenses of the motor road vehicles were 9 31d. Office expenses amounted to ·79d.; permanent way expenses, ·24d.; rent, rates, and royalties, ·10d.; making the total for the working expenses, 5·39d. The company has been authorised to make certain extensions, but owing to the war it is not deemed advisable to proceed with the construction at present.

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

TABLE I.—TOWNS WITH COMBINED GENERATING STATION FOR TRACTION AND LIGHTING PURPOSES.

Name.	Year Ended.	Electric Traction Inaugurated.	System.	Line open (single track). Mls. Chs.	Borrowing Powers.	Borrowing Powers Exercised.	Unexhausted Borrowing Powers.	Total Capital Expenditure.	Capital Expenditure per Mile of Single Track.	Loans Outstanding.	Loans Repaid and Sinking Fund.	Depreciation, Renewal and Reserve Funds.	Gross Receipts. Traffic.	Other.	Total.
Aberdeen ...	* May 31, 1914	Dec., 1899	E.	27 72	415,000	357,191	57,809	357,191	12,802	186,885	246,163	169,987	84,276	991	85,267
Accrington ...	* Mar. 31, 1914	Aug., 1907	,,	10 53	181,925	133,875	48,050	134,734	12,636	113,870	20,864	16,581	29,843	350	30,193
Ashton-u-Lyne..	* Mar. 25, 1914	Aug., 1902	,,	8 15	130,070	109,814	20,256	109,814	13,412	73,958	32,270	2,950	23,341	677	24,019
Ayr	* May 15, 1914	Sept., 1901	,,	9 30	...	...	...	100,841	10,756	79,171	19,460	16,489	18,315	1,062	19,377
Birmingham ...	* Mar. 31, 1914	Jan., 1904	,,	114 44	2,577,611	2,352,104	225,507	2,334,437	20,379	1,913,559	438,545	186,154	628,016	7,455	635,471
Blackburn ...	* Mar. 25, 1914	Mar., 1899	,,	24 63	408,174	342,474	65,700	335,735	13,544	248,578	182,557	2,146	68,192	3,147	71,339
Blackpool ...	* Mar. 31, 1914	June, 1899	,,	(p)21 33	453,798	310,994	142,804	310,994	14,524	310,994	126,036	21,660	84,034	763	84,797
Bolton	* Mar. 31, 1914	Dec., 1899	,,	47 19	551,092	551,092	...	566,395	11,961	399,417	178,850	50,819	142,504	1,270	143,774
Bradford ...	* Mar. 31, 1914	July, 1898	,,	(h)106 29	1,280,788	1,061,113	219,675	1,040,118	9,779	653,504	420,844	82,898	298,525	18,608	317,133
Brighton	* Mar. 31, 1914	Nov., 1901	,,	17 15	378,093	277,905	100,188	278,467	16,202	219,972	62,273	5,841	54,600	2,238	56,838
Burnley	* Mar. 31, 1914	Dec., 1901	,,	22 18	388,052	325,999	62,053	232,501	10,461	179,136	64,381	39,684	88,050	266	88,316
Burton-on-Trent	* Mar. 31, 1914	Aug., 1903	,,	10 50	108,632	104,562	4,070	106,275	10,121	49,239	55,323	10,134	15,010	1,497	16,507
Bury	* Mar. 31, 1914	June, 1903	,,	21 2 (b)13 21	407,800	284,745	123,055	286,989	13,650	255,455	49,013	(i)29,518	69,745	335	70,080
Chester	* Mar. 25, 1914	April, 1903	,,	6 35	92,991	82,380	10,611	82,934	12,883	68,477	14,121	4,282	12,793	480	13,273
Chesterfield ...	* Mar. 31, 1914	Dec., 1904	,,	5 8	98,000	73,500	24,500	69,810	13,663	57,660	13,820	6,307	13,608	465	14,073
Colchester ...	* Mar. 31, 1914	July, 1904	,,	7 75	70,748	69,555	1,193	69,401	8,743	50,816	19,483	Nil.	10,390	509	10,899
Croydon	* Mar. 31, 1914	(q) Sept., 1901	,,	17 50	287,689	287,689	Nil	284,847	16,162	229,300	96,719	42,352	84,926	2,100	87,026
Darlington ...	* Mar. 31, 1914	June, 1904	,,	8 71	107,500	77,832	29,668	77,786	8,752	56,178	23,338	6,806	12,976	261	13,237
Darwen	* Mar. 31, 1914	Oct., 1900	,,	7 13	93,400	86,300	7,100	85,831	11,984	55,090	30,892	8,500	15,631	1,003	16,634
Derby	* Mar. 31, 1914	July, 1904	E. H.	22 20	... ...	... ...	... ...	245,332 ...	11,026 ...	177,676 ...	67,656 ...	(i)32,356 ...	E51,126 H 429	1,048 19	52,174 448
Doncaster ...	Mar. 31, 1913	June, 1902	E.	12 42	...	...	...	99,172	7,918	80,400	14,741	780	19,928	334	20,262
Dundee	* May 15, 1914	July, 1900	,,	28 32	(f)	354,783	...	362,116	12,751	264,720	90,062	82,966	67,754	1,750	69,504
East Ham ...	* Mar. 31, 1914	June, 1901	,,	14 5	190,643	190,242	401	191,654	13,127	140,457	65,478	5,453	54,079	836	54,915
Exeter	* Mar. 31, 1914	April, 1905	,,	7 0	106,000	86,111	19,889	86,111	12,301	67,354	19,249	6,290	17,489	97	17,586
Gloucester ...	* Mar. 31, 1914	April, 1904	,,	15 1	191,000	144,333	46,667	147,783	9,846	107,275	20,592	1,000	16,829	1,188	18,017
Halifax	* Mar. 31, 1914	June, 1898	,,	55 39	449,263	417,466	31,797	419,335	7,557	297,327	119,433	31,745	108,617	1,033	109,650
Ilford	Mar. 31, 1913	Mar., 1903	,,	11 28	149,633	149,633	Nil	149,500	13,171	103,912	39,721	5,611	24,361	2,407	26,768
Ilkeston	Mar. 31, 1913	May, 1903	,,	3 60	64,214	47,000	17,214	47,883	12,769	42,500	13,660	Nil	6,006	58	6,064
Ipswich	* Mar. 31, 1914	Nov., 1903	,,	14 70	116,471	114,300	2,171	115,676	7,776	96,912	18,447	11,994	22,964	862	23,826
Keighley	Mar. 31, 1913	Oct., 1904	,,	6 9	50,934	47,328	3,606	47,328	7,743	32,468	16,961	942	8,845	313	9,158
Kilmarnock ...	* May 15, 1914	Dec., 1904	,,	5 47	65,000	52,795	12,205	53,281	9,536	47,250	8,707	5,298	9,088	265	9,353
Kirkcaldy ...	* May 15, 1914	Feb., 1903	,,	8 65	213,000	96,749	116,251	96,749	10,979	77,868	18,881	4,687	17,506	443	17,949
Lancaster ...	* Mar. 31, 1914	Jan., 1903	,,	4 65	...	45,700	...	43,684	9,077	30,450	15,350	3,074	5,779	158	5,937
Leith	* May 15, 1914	Aug., 1905	,,	17 73	275,000	238,000	37,000	236,877	13,211	179,350	58,650	3,045	36,555	1,170	37,725
Leyton	* Mar. 31, 1914	Dec., 1906	,,	18 8	324,201	324,145	56	295,376	16,319	240,741	57,244	2,654	69,148	1,541	70,689
Lincoln	* Mar. 31, 1914	Nov., 1905	S.	2 77	98,519	44,947	53,572	44,987	15,185	41,579	11,176	(k) 1,100	6,971	130	7,101
Liverpool ...	Dec. 31, 1913	Nov., 1898	E.	119 0	...	...	...	2,024,706	17,014	1,177,384	1,091,771	428,318	677,881	13,018	690,899
Lowestoft ...	Sep. 30, 1913	July, 1903	,,	4 6	96,230	89,912	6,318	89,912	22,064	76,283	15,251	...	11,365	296	11,661
Maidstone ...	* Mar. 31, 1914	July, 1904	,,	7 3	82,932	82,932	...	79,098	11,239	65,574	17,358	...	10,391	575	10,966
Manchester ...	* Mar. 31, 1914	June, 1901	,,	202 48	2,358,606	2,117,411	141,195	2,130,904	10,518	1,616,131	491,410	478,381	911,223	14,087	925,310
Nelson	* Mar. 31, 1914	Feb., 1903	,,	3 69	38,000	37,885	115	37,885	9,808	29,145	8,740	...	10,801	52	10,853
Newport (Mon.) ..	* Mar. 31, 1914	April, 1903	,,	14 28	219,250	196,250	23,000	194,983	13,588	159,734	45,350	4,055	40,151	1,039	41,190
Nottingham ...	* Mar. 31, 1914	Jan., 1901	,,	...	...	...	...	667,705	...	410,091	237,501	68,372	172,731	2,648	175,379
Oldham	* Mar. 25, 1914	May, 1902	,,	28 6 (b) 8 31	509,723	442,047	67,676	444,565	15,835	311,148	133,167	8,455	114,481	1,689	116,170
Perth	May 15, 1913	Nov., 1905	,,	6 60	90,000	78,350	11,650	78,629	11,649	63,340	15,489	1,673	8,761	509	9,270
Plymouth ...	Mar. 31, 1913	Sept., 1899	,,	15 0	...	189,512	...	219,417	14,628	90,925	37,826	17,550	37,925	1,123	39,048
Pontypridd ...	Mar. 31, 1913	Mar., 1905	,,	8 48	136,019	135,919	100	137,148	15,946	109,757	26,052	Nil	21,580	313	21,893
Rawtenstall ...	* Mar. 31, 1914	May, 1909	,,	15 71	193,290	182,168	11,122	182,273	11,473	156,813	25,355	3,870	26,873	369	27,242
Rochdale	* Mar. 31, 1914	May, 1902	,,	(i) 40 2	356,991	347,782	9,209	353,066	16,020	347,782	95,573	11,000	82,878	298	83,176
Rotherham ...	* Mar. 31, 1914	Jan., 1903	,, R.T	12 2 ...	... ...	183,775 ...	... ...	184,859 ...	14,537 ...	152,244 ...	33,481 ...	24,632 ...	44,495 5,757	70 ..	44,565 5,767
Salford	* Mar. 31, 1914	Oct., 1901	E.	75 64	1,050,666	724,469	326,197	723,923	9,554	532,821	191,648	28,492	272,758	54	272,812
Southampton ...	* Mar. 31, 1914	Jan., 1900	,,	18 54	277,241	261,219	16,022	258,299	13,831	164,454	89,483	13,433	67,672	2,926	70,598
Southend-on-Sea	Mar. 31, 1913	July, 1901	,,	11 49	130,000	129,961	39	143,808	12,384	116,940	12,784	3,045	34,453	465	34,918
Southport ...	* Mar. 31, 1914	July, 1900	,,	(d) 10 63	294,000	197,730	94,270	196,178	9,921	150,250	47,480	442	18,391	455	18,846
South Shields ...	* Mar. 31, 1914	Mar., 1906	,,	10 21	251,882	175,056	76,826	173,599	16,916	146,912	33,413	(l)26,881	37,744	586	38,330
Staly'ge, H., M., D.	* Mar. 31, 1914	May, 1904	,,	27 57	325,270	274,990	44,280	279,778	10,096	217,173	63,817	811	40,333	292	40,625
Stockport ...	* Mar. 31, 1914	Aug., 1901	,,	27 5	...	...	...	251,514	9,294	158,391	76,109	37,179	66,715	1,322	68,037
Sunderland ...	* Mar. 31, 1914	Aug., 1900	,,	20 28	308,699	303,211	5,488	305,493	15,012	172,370	121,890	39,508	74,861	365	75,226
Wallasey ...	* Mar. 31, 1914	Mar., 1902	,,	19 77	198,867	195,290	3,577	216,498	10,848	161,934	64,221	9,520	63,151	562	63,713
Walsall	Dec. 31, 1913	Dec., 1902	,,	19 44	188,145	188,100	45	183,351	9,378	159,561	58,366	33,873	32,991	682	33,673
Walthamstow ...	* Mar 31, 1914	June, 1905	,,	13 30	198,000	194,000	4,000	188,192	14,070	171,716	21,781	1,940	38,590	718	39,308
Warrington ...	* Mar. 31, 1914	April, 1902	,,	9 52	103,674	102,896	778	102,128	10,583	70,476	32,422	10,000	23,232	521	23,753
West Ham ...	* Mar. 31, 1914	Feb., 1904	,,	30 4	563,478	551,588	11,890	556,878	18,532	527,934	104,716	32,740	142,034	3,155	145,189
Wigan	* Mar. 31, 1914	April, 1901	,,	30 73	500,955	483,757	17,198	473,906	15,349	392,118	142,815	804	77,973	1,375	79,348
Wolverhampton	* Mar. 31, 1914	April, 1902	S.	21 40	279,733	268,185	11,548	287,569	13,378	215,166	61,351	54,864	56,444	759	57,203
Yarmouth (Gt.) ..	* Mar. 31, 1914	June, 1902	E.	14 58	149,600	124,750	24,850	126,363	9,207	116,450	25,996	9,075	25,712	527	26,239
York	* Mar. 31, 1914	Jan., 1910	,,	12 20	157,150	157,150	340	156,810	12,853	152,470	6,323	5,092	26,133	642	26,775

TABLE II.—TOWNS WITH SEPARATE GENERATING STATIONS FOR TRACTION.

Belfast	* Mar. 31, 1914	Nov., 1905	E.	98 54	1,528,146	1,381,200	146,946	1,440,959	14,565	1,343,000	224,840	97,783	268,250	3,812	272,062
Bexley	* Mar. 31, 1914	Oct., 1903	,,	6 42	100,798	98,812	1,986	98,408	15,376	75,408	23,403	942	14,698	1,649	16,346
Birkenhead ...	* Mar. 31, 1914	Feb., 1901	,,	24 7	376,398	369,528	6,870	371,097	15,406	239,201	130,267	22,655	67,725	4,300	72,025
Bournemouth ...	* Mar. 31, 1914	July, 1902	,,	(e) 29 62	432,440	...	...	443,006	19,821	286,385	146,054	18,409	104,353	616	104,969
Cardiff	* Mar. 31, 1914	May, 1902	,,	31 66	830,382	787,292	43,090	786,510	24,714	514,059	273,232	104,002	141,519	24,681	166,200
Coventry ...	* Mar. 31, 1914	Jan., 1912	,,	15 61	251,014	235,574	15,440	229,197	14,541	230,596	8,517	3,983	42,751	733	43,484
Glasgow	* May 31, 1914	Oct., 1898	,,	193 40 (b) 2 53	3,714,266	3,694,143	20,123	3,675,317	19,023	2,517,360	1,176,783	2,196,808	1,078,691	5,156	1,083,847
Huddersfield ...	* Mar. 31, 1914	Feb., 1901	,,	48 41	772,662	407,142	365,520	458,878	9,460	239,984	176,542	30,974	112,660	3,660	116,320
Hull	* Mar. 31, 1914	July, 1899	,,	33 12	645,073	565,998	79,075	566,754	17,096	552,191	164,991	137,060	165,892	1,074	166,966
Leeds	* Mar. 31, 1914	Aug., 1897	,,	114 5	1,701,455	1,626,422	75,033	1,571,196	14,384	1,286,916	534,631	4,801	423,516	3,939	427,455
Leicester ...	Dec. 31, 1913	May, 1904	,,	37 0	929,120	727,405	201,715	739,982	19,999	602,478	129,807	100,000	147,458	17,059	164,517
London	* Mar. 31, 1914	...	H.	13 73	...	...	...	...	...	...	...	...	21,145	480	21,635
		May, 1903	C.E	277 26	(c)	(c)	(c)	13,028,119	..	9,923,528	3,370,966	730,346	2,181,344	65,698	2,247,042
N'castle-on-Tyne	* Mar. 31, 1914	Dec., 1901	E.	62 72	1,522,010	1,277,747	244,263	1,284,380	20,428	929,766	428,119	94,337	251,024	10,177	261,201
Northampton ...	* Mar. 31, 1914	July, 1904	,,	9 16	239,800	127,255	112,545	126,431	13,742	87,022	40,501	11,834	28,527	812	29,339
Portsmouth ...	* Mar. 31, 1914	Sep., 1901	,,	34 51	708,618	708,618	...	772,684	22,308	449,206	259,413	75,054	115,168	1,823	116,991
Preston	Mar. 31, 1913	June, 1904	,,	17 16	224,102	187,270	36,832	187,269	10,888	119,790	42,091	36,841	42,964	306	43,270
Reading	* Mar. 31, 1914	July, 1903	,,	13 14	235,000	234,000	1,000	230,763	17,515	162,634	68,159	18,371	35,282	1,043	36,325
Sheffield	* Mar. 25, 1914	Sep., 1899	,,	79 3	1,640,371	1,426,217	214,154	1,521,439	19,250	1,073,612	463,575	30,378	386,114	3,562	389,676
Wellington, N.Z.	* Mar. 31, 1914	...	,,	31 55	496,423	496,423	...	628,151	19,821	496,423	46,836	120,191	157,096	1,161	158,257

C—Electric conduit system. E—Electric trolley system. H—Horse lines RT—Railless trolley system. S—Surface contact system.
(b) Additional lines leased and worked. (c) Conferred by Annual Money Act, which limits amount for each financial year. Powers not exercised are lapsed.
(d) Not including 8 m. 78 ch. leased lines. (e) Includes 7 mi. 34 chs. leased lines. (f) Unlimited. (h) Includes 1¼ miles railless trolley route. (i) 17 mi. 8 chn. single track leased.
(k) Not including 10 miles 3 chains single track lines leased. (l) Including Insurance. (p) Including leased lines. (q) Corporation working commenced June 1906.

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

Specially Compiled for "The Tramway and Railway World."

TABLE I.—TOWNS WITH COMBINED GENERATING STATION FOR TRACTION AND LIGHTING PURPOSES.

Name.	Working Expenses.					Gross Profit on Working.	Additions to Gross Profit.	Deductions from Gross Profit.					Net Surplus + or Deficit −
	Traffic.	General.	Repairs & Maintenance.	Power.	Total.			Interest.	Sinking Fund.	Income Tax.	Depreciation & Renewal.	Sundries.	Total.	
Aberdeen	22,265	10,290	7,180	7,301	47,036	38,231	1,102	6,701	4,897	...	14,533	213	26,344	+ 12,989
Accrington	7,570	2,792	2,268	4,880	17,510	12,683	...	3,969	3,783	198	3,100	65	11,115	+ 1,568
Ashton-under-Lyne	5,149	1,682	3,053	3,372	13,256	10,763	...	2,590	3,760	477	800	39	7,666	+ 3,097
Ayr	4,206	2,093	1,905	2,457	10,661	8,716	...	(h) 2,558	1,744	164	2,503	606	7,575	+ 1,141
Birmingham	183,119	59,947	88,698	113,743	445,507	189,964	8,487	68,478	53,804	...	...	197	122,479	+ 75,972
Blackburn	17,263	4,947	14,659	10,301	47,170	24,169	...	4,803	15,176	179	...	...	20,158	+ 4,011
Blackpool	16,643	6,851	9,719	10,273	43,486	41,311	...	(h) 9,429	7,329	...	10,000	...	26,758	+ 14,553
Bolton	50,721	9,423	16,898	20,151	77,193	66,581	995	h) 11,230	17,387	1,239	18,357	1,446	49,659	+ 17,917
Bradford	92,305	29,243	58,991	50,611	231,150	85,983	3,877	20,443	31,822	3,888	11,454	5,053	72,660	+ 17,200
Brighton	14,691	4,716	14,420	8,613	42,440	14,398	122	7,895	5,783	...	...	...	13,678	+ 842
Burnley	23,284	7,571	11,998	20,096	62,949	25,367	...	6,939	7,728	1,072	...	(f) 1,941	17,680	+ 7,687
Burton-on-Trent	5,442	1,502	2,562	3,154	12,660	3,847	(q) 1,524	1,364	1,344	...	1,500	...	4,208	+ 1,163
Bury	15,735	5,416	7,011	7,684	35,846	34,234	151	7,904	4,895	462	3,124	(w) 12,000	28,385	+ 6,000
Chester	3,290	1,534	1,208	2,096	8,128	5,145	158	(h) 2,754	1,018	...	...	...	3,772	+ 1,531
Chesterfield	3,214	1,368	2,936	2,192	9,710	4,363	269	2,275	1,900	...	...	...	4,175	+ 497
Colchester	2,783	1,286	2,177	2,566	8,812	2,087	67	2,081	2,406	...	...	...	4,487	− 2,333
Croydon	29,938	6,976	14,626	18,203	69,743	17,283	664	7,943	7,415	1,227	...	1,132	17,717	+ 230
Darlington	4,305	812	1,995	2,012	9,124	4,113	101	(h) 1,944	1,996	102	469	...	4,511	− 287
Darwen	3,980	1,018	3,287	2,569	10,854	5,780	156	2,247	2,190	...	1,050	...	5,487	+ 449
Derby	£ 17,320 H 540	2,906	5,499 81	8,610 ...	34,335 621	17,839 def. 173	239	6,236	3,464	...	5,536	(l) 185	15,421	+ 2,657
Doncaster	4,364	1,156	4,698	3,561	13,779	6,483	84	2,876	1,737	...	664	...	5,277	+ 1,206
Dundee	17,495	5,964	9,477	10,502	43,438	26,066	...	8,742	6,400	211	9,701	...	25,054	+ 1,012
East Ham	18,739	6,802	12,067	10,521	48,129	6,786	...	(h) 5,570	6,882	...	...	573	13,025	− 6,239
Exeter	4,888	1,373	1,483	3,827	11,571	6,015	...	(h) 2,305	1,885	101	...	...	4,291	+ 1,724
Gloucester	7,027	1,703	3,226	1,925	13,881	4,136	...	(h) 5,325	1,980	95	250	...	7,650	− 3,514
Halifax	29,239	7,803	15,805	20,426	73,273	36,377	...	10,288	11,617	...	56	773	22,734	+ 13,643
Ilford	9,482	2,424	4,116	4,279	20,301	6,467	557	4,894	4,146	...	...	...	9,040	− 2,016
Ilkeston	2,057	614	2,497	1,308	6,476	def. 412	524	1,748	1,694	...	...	(t) 412	3,854	− 3,330
Ipswich	8,538	2,250	5,578	3,522	19,888	3,938	...	(h) 3,624	2,142	...	...	...	5,766	− 1,828
Keighley	2,692	768	899	1,612	5,971	3,187	179	1,116	1,881	...	...	(m) 369	3,366	...
Kilmarnock	3,195	746	1,327	1,717	6,985	2,368	...	1,628	1,252	...	1,160	...	4,040	− 1,672
Kirkcaldy	4,942	1,424	2,007	3,081	11,454	6,495	...	2,656	2,355	...	410	233	5,654	+ 841
Lancaster	2,290	522	841	1,594	5,247	690	52	1,158	1,511	...	...	...	2,669	− 1,927
Leith	9,742	3,131	5,080	3,920	21,873	15,852	242	(h) 6,211	7,850	...	2,274	67	16,402	− 333
Leyton	(p) 22,360	8,611	13,711	12,923	57,605	13,084	133	10,007	8,461	...	...	202	18,670	− 5,453
Lincoln	1,473	644	973	960	4,050	3,051	402	1,529	1,071	...	...	...	2,600	+ 853
Liverpool	180,226	61,361	84,026	121,185	446,798	244,101	24,220	48,971	60,318	...	(d) 54,163	e) 4,869	168,321	+ 100,000
Lowestoft	3,320	743	1,579	2,685	8,327	3,334	..	(h) 2,499	2,031	...	...	...	4,530	− 1,196
Maidstone	2,609	1,062	1,686	1,934	7,291	3,675	57	2,470	1,969	...	...	114	4,553	− 821
Manchester	276,663	89,420	89,649	129,492	585,224	340,086	13,594	(h) 55,729	54,599	9,418	97,219	33,625	250,590	+ 103,090
Nelson	2,537	684	1,525	2,123	6,869	3,984	...	978	1,026	...	...	...	2,004	+ 1,980
Newport (Mon.)	10,513	4,240	13,070	6,670	34,493	6,697	925	5,850	4,231	...	...	158	10,239	− 2,617
Nottingham	44,898	15,328	19,776	28,420	108,422	66,957	...	14,124	20,270	...	1,000	550	35,944	+ 31,013
Oldham	26,908	8,585	22,246	20,564	78,303	37,867	1,317	15,559	11,718	1,352	...	(g) 5,654	34,283	+ 4,901
Perth	3,182	698	418	1,252	5,550	3,720	50	1,523	1,632	3	612	...	3,770	...
Plymouth	8,031	4,161	4,322	7,905	24,419	14,629	1,257	4,793	3,932	...	4,465	...	13,130	+ 2,906
Pontypridd	5,017	1,395	5,476	3,196	15,084	6,809	1,754	(h) 4,009	4,160	...	...	39	8,208	+ 355
Rawtenstall	5,877	2,966	3,130	4,304	16,277	10,965	3,422	5,626	6,280	...	...	1,860	13,766	+ 621
Rochdale	18,788	5,167	9,525	10,949	44,429	38,747	1,397	11,485	9,594	1,020	...	(z) 9,555	31,654	+ 8,490
Rotherham	E 10,374 RT 1,310	3,084 409	7,888 1,434	9,918 658	31,284 3,811	13,301 1,946	209 31	5,008 400	3,465 568	...	...	...	8,473 968	+ 5,037 + 1,009
Salford	79,460	23,804	25,203	50,303	178,770	94,042	5,044	(h) 17,392	22,470	2,760	5,674	(k) 28,790	77,086	+ 22,000
Southampton	19,977	5,011	9,212	12,321	46,521	24,077	180	7,333	7,433	554	...	...	15,320	+ 8,937
Southend-on-Sea	8,046	2,260	3,534	6,187	20,027	14,891	4,228	(h) 3,834	1,753	...	4,017	...	9,605	+ 9,514
Southport	4,754	2,126	3,103	2,999	12,982	5,864	6,379	6,516	5,018	...	2,144	...	13,678	− 1,435
South Shields	8,838	3,715	3,633	6,399	22,585	15,745	265	(h) 5,333	3,570	...	...	...	8,903	+ 7,107
Staly'dge, H., M., D.	13,073	4,883	6,163	6,724	30,843	9,782	...	(h) 7,093	7,527	...	311	721	15,652	− 5,870
Stockport	14,828	4,583	10,045	5,964	35,420	32,617	1,170	5,432	8,909	1,163	2,369	(j) 3,414	21,287	+ 12,500
Sunderland	19,609	5,291	6,482	11,276	42,661	32,565	259	(h) 6,837	9,948	637	10,002	400	27,824	+ 5,000
Wallasey	17,686	4,792	6,512	11,500	40,490	23,223	92	5,603	4,885	...	...	634	11,122	+ 12,193
Walsall	8,019	3,201	4,678	5,710	21,608	12,065	1,371	5,191	3,439	458	1,868	...	10,956	+ 2,480
Walthamstow	14,821	3,234	7,416	8,568	34,039	5,269	301	(h) 6,396	3,265	...	3,645	...	13,306	− 7,736
Warrington	5,999	1,834	3,973	3,411	15,217	8,536	537	2,481	3,353	...	...	...	5,834	+ 3,239
West Ham	53,477	18,084	33,440	21,174	126,175	19,014	...	20,056	12,398	692	...	290	33,436	− 14,422
Wigan	16,604	5,226	11,643	11,016	44,489	34,859	308	14,197	12,561	...	...	(e) 3,719	30,477	+ 4,690
Wolverhampton	12,793	5,177	7,620	7,536	33,126	24,077	(x) 1,305	7,793	5,285	187	6,564	...	19,829	+ 6,553
Yarmouth (Gt.)	7,756	1,849	3,052	4,951	17,608	8,631	75	(h) 4,065	2,826	...	1,815	...	8,706	...
York	8,713	2,028	1,936	5,259	17,936	8,839	...	(h) 4,609	1,706	...	...	...	6,315	+ 2,524

TABLE II.—TOWNS WITH SEPARATE GENERATING STATIONS FOR TRACTION.

Belfast	77,949	12,593	41,455	28,281	160,278	111,784	931	48,342	31,353	1,072	17,000	3,082	100,849	+ 11,866
Bexley	3,282	1,382	*3,554	828	(a) 11,630	4,716	...	2,794	2,509	...	324	...	5,627	− 911
Birkenhead	17,015	5,374	11,759	10,744	44,892	27,133	83	(h) 11,577	9,499	373	5,712	55	27,216	...
Bournemouth	24,154	8,350	10,307	16,200	59,011	45,958	2,550	(h) 10,265	15,255	...	12,871	(e) 8,117	46,508	+ 2,000
Cardiff	44,037	11,121	18,146	26,260	99,564	66,636	2,592	23,941	23,014	2,835	6,946	...	56,736	+ 12,492
Coventry	12,861	4,471	7,945	3,833	29,110	14,368	478	8,506	5,230	...	277	414	14,427	+ 419
Glasgow	332,546	134,034	156,214	53,483	676,277	407,570	64,989	82,921	102,607	14,057	212,642	6,440	418,667	+ 53,892
Huddersfield	28,548	6,253	27,821	8,349	70,971	45,349	519	(h) 11,617	11,004	1,545	...	406	24,572	+ 21,296
Hull	50,246	14,935	41,885	11,803	118,869	48,097	879	16,953	12,954	1,425	3,374	...	34,706	+ 14,270
Leeds	113,819	41,144	41,020	30,399	226,382	201,073	8,354	44,961	53,914	5,344	31,576	3,627	139,422	+ 70,005
Leicester	54,257	10,405	21,566	23,887	110,115	54,402	3,763	23,541	12,453	2,122	7,636	2,413	48,165	+ 10,000
London	L 10,806 C 809,987	3,679 r) 183,797	4,059 m) 11,671	8,590 246,328	30,215 1,585,251	def. 8,590 661,791	34,032	328,109	408,488	28,197	1,476	(l) 18,079	784,349	− 88,326
N'castle-on-Tyne	71,892	25,519	27,150	22,991	147,552	113,649	4,086	(h) 31,257	41,450	3,618	...	2,805	79,130	+ 38,605
Northampton	7,881	3,169	2,806	4,958	18,814	10,525	505	(h) 3,322	4,422	303	195	b) 1,083	9,331	+ 1,700
Portsmouth	31,669	11,041	8,901	6,009	57,620	59,371	(a) 12,203	21,593	18,263	1,302	11,714	...	52,872	+ 18,702
Preston	10,781	4,592	6,263	2,429	24,065	19,205	...	3,933	4,891	..	3,649	1,358	13,831	+ 5,374
Reading	8,635	3,661	4,086	3,597	19,979	16,346	...	6,716	5,062	149	...	...	11,927	+ 4,419
Sheffield	121,630	27,956	48,047	35,128	232,761	156,915	2,821	35,305	43,518	3,306	30,123	7,871	120,123	+ 39,613
Wellington, N.Z.	57,973	7,775	21,918	17,947	105,613	52,644	2,091	19,865	4,757	...	14,682	...	39,304	+ 15,431

(a) Includes £11,874 balance forward from previous year. (b) Includes £311 loss on omnibus account. (c) Includes £1,611 insurance fund.
(d) Includes reserve. (e) Includes rents for leased lines. (f) Rent of leased lines. (g) Rent of lines and deficit on motor omnibus account.
(h) Loss on working. (j) Includes £692 deficit on railless traction. (k) Includes rents of lines. (l) Including loss on horse traction. (m) Horsing expenses.
(n) Transferred to motor omnibus capital account. (o) Includes £1,337 through-running contributions. (p) Includes £407 horse account.
(r) Including special charges, £6,053. (s) Includes £2,584 through-running contributions to L.C.C. (w) Amount apportioned to leased lines.
(x) Includes £365 profit on motor char-a-banc. (z) Includes £6,519 rent of leased lines. : £2,950 profit from 3 months' working.
* Includes £1,913 spent on renewals.

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

Specially Compiled for "The Tramway and Railway World."

TABLE I.—TOWNS WITH COMBINED GENERATING STATION FOR TRACTION AND LIGHTING PURPOSES.

Name.	Appropriation of Net Surplus.			Receipts per Car Mile.		Operating Expenses per Car Mile.					Percentage of Operating Expenses to Total Revenue.	Average Operating Expenses per Car Mile (excludi'g Power Cost).	Board of Trade Units.		
	Carried Forward.	Reserve.	Contribution to Rates or Municip'l Funds.	Average Total per Car Mile.	Average Traffic per Car Mile.	Traffic.	General.	Repairs and Maintenance.	Power. (Price paid)	Total.			Units.	Cost per Unit.	Units used per car mile.
				d.	d.	d.	d.	d.	d.	d.	%	d.		d.	
Aberdeen ...	...	12,989	...	11·17	11·04	2·916	1·348	·940	·956	6·16	55·16	5·415	2,170,033	·80	1·184
Accrington ...	...	...	1,568	12·64	12·49	3·17	1·18	·94	2·04	7·33	57·99	5·29	949,054	1·23	1·65
Ashton-u-Lyne	47	...	3,050	12·4197	12·0692	2·6622	·8695	1·5788	1·7434	6·8539	55·19	5·1105	640,413	1·25	1·38
Ayr...	...	1,141	...	10·45	9·88	2·26	1·12	1·02	1·32	5·75	55	4·42	421,844	1·39	·94
Birmingham ...	...	31,000	44,972	10·689	10·564	3·080	1·009	1·492	1·913	7·494	70	5·581	24,257,823	1·125	1·70
Blackburn ...	4,011	...	...	14·08	13·46	3·41	·97	2·93	2·06	9·37	66·10	7·37	1,901,668	1·3	1·64
Blackpool ...	...	2,553	12,000	18·91	18·74	3·71	1·52	2·17	2·29	9·69	51·28	7·40	1,506,323	1·63	1·40
Bolton	417	...	17,500	11·944	11·838	2·552	·782	1·404	1·674	6·412	53·064	4·664	4,396,543	1·1	1·52
Bradford	...	...	17,200	12·166	11·486	3·204	1·051	2·173	1·948	8·376	73·138	6·428	12,041,279	1	1·924
Brighton	842	...	...	11·794	11·33	3·049	·978	2·992	1·787	8·806	74·66	7·02	1,722,548	1·2	1·49
Burnley	...	...	7,687	12·079	12·043	3·185	1·035	1·640	2·749	8·609	71·37	5·86	3,894,011	1·24	2·22
Burton-on-Trent	1,163	...	...	9·02	8·28	2·97	·82	1·40	1·72	6·91	76·7	5·08	545,672	1·39	1·08
Bury	...	(k)1,000	5,000	10·38	10·26	2·315	·769	1·213	1·252	5·549	50·44	4·297	2,037,620	1	1·252
Chester	...	1,531	...	9·17	8·84	2·27	1·06	·83	1·45	5·61	61	4·17	378,158	1·33	1·08
Chesterfield ...	...	457	...	11·1	10·8	2·54	1·08	2·31	1·73	7·66	68·9	5·93	420,824	1·25	1·38
Colchester ...	...	...	...	8·038	7·682	2·058	·95	1·61	1·897	6·515	80·36	4·618	410,555	1·5	1·26
Croydon	...	230	...	7·464	7·284	2·568	·599	1·254	1·561	5·982	79·53	4·42	2,874,462	1·522	1·027
Darlington ...	...	...	...	8·230	8·068	2·676	·505	1·241	1·251	5·673	68·93	4·422	482,791	1	1·25
Darwen	449	...	...	14·96	14·09	3·20	·92	2·96	2·31	9·39	65·25	7·08	469,939	1·312	1·77
Derby	(n) 75	...	...	E 10·358	10·150	3·438	·577	1·092	1·709	6·816	65·8	5·107	1,425,112	1·45	1·179
				H. 6·077	5·821	7·325	...	1·099	...	8·424	138·6	...	...	...	...
Doncaster ...	...	1,290	...	9·41	9·25	2·03	·54	2·18	1·65	6·40	69·1	4·75	683,651	1·25	1·32
Dundee	...	12	1,000	12·018	11·716	3·026	1·031	1·639	1·815	7·511	62·49	5·696	2,520,470	1	1·815
East Ham ...	...	...	...	8·73	8·59	2·98	1·08	1·92	1·67	7·65	87·60	5·98	2,385,535	1·062	1·58
Exeter	...	1,724	...	9·456	9·404	2·628	·738	·797	2·059	6·222	65·8	4·163	565,247	1·625	1·27
Gloucester ...	...	...	...	6·77	6·32	2·64	·64	1·21	·72	5·21	77	4·49	481,967	1	·72
Halifax	1,818	5,792	6,033	11·738	11·627	3·130	·836	1·692	2·186	7·844	67	5·66	4,357,466	1·125	1·94
Ilford	...	...	...	7·616	7·464	2·698	·689	1·171	1·218	5·776	76·4	4·558	960,866	1·07	1·098
Ilkeston	...	...	...	6·727	6·661	2·281	·681	2·77	1·451	7·183	106·79	5·732	326,198	1	1·50
Ipswich	...	...	...	8·552	8·242	3·055	·807	2·002	1·265	7·139	83·47	5·874	676,189	1·25	1·011
Keighley	...	...	...	9·064	8·754	2·664	·761	·890	1·595	5·910	65	4·315	254,636	1·5	1·05
Kilmarnock ...	...	...	...	7·539	7·326	2·57	·61	1·07	1·38	5·63	74·6	4·246	329,577	1·25	1·14
Kirkcaldy ...	341	...	500	9·162	8·936	2·522	·727	1·024	1·573	5·846	65·43	4·273	739,564	1	1·573
Lancaster ...	...	...	...	8·23	7·94	3·14	·71	1·16	2·19	7·20	88	5·02	225,094	1·7	1·29
Leith	...	...	...	9·54	9·24	2·46	·79	1·29	·99	5·53	57·98	4·54	939,737	1·001	·99
Leyton	...	...	...	9·355	9·151	(c) 2·959	1·140	1·815	1·710	7·624	81·338	5·914	3,043,900	1·019	1·678
Lincoln	853	...	...	10·36	10·17	2·15	·94	1·42	1·40	5·91	57	4·51	190,838	1·25	1·12
Liverpool ...	...	...	100,000	12·34	12·10	3·217	1·096	1·500	2·164	7·977	63·2	5·813	23,928,396	1·138	1·78
Lowestoft ...	...	...	...	8·5	8·3	2·50	·56	1·2	2·0	6·26	71·58	4·26	368,242	1·75	1·1
Maidstone ...	...	...	...	8·51	8·06	2·02	·81	1·34	1·48	5·65	70·07	4·17	371,290	1·25	1·2
Manchester ...	...	...	103,090	11·410	11·236	3·411	1·103	1·105	1·597	7·216	63·25	5·619	30,035,057	1·034	1·543
Nelson	1,980	...	...	12·85	12·78	3·00	·81	1·81	2·51	8·13	63	5·62	255,621	2	1·26
Newport (Mon.)...	...	...	...	10·207	9·950	2·605	1·056	3·239	1·653	8·553	83·74	6·913	1,187,262	1·29	1·23
Nottingham ...	...	7,013	24,000	...	11·87	3·04	1·04	1·34	1·92	7·34	61·82	5·42	5,359,804	1·25	1·51
Oldham	...	4,901	...	13·422	13·228	3·109	·992	2·570	2·376	9·047	67·40	6·671	3,291,607	1·5	1·585
Perth	...	...	...	8·79	8·31	3·02	·66	·39	1·19	5·26	59	4·07	277,474	1·08	1·09
Plymouth ...	...	...	2,696	11·790	11·094	2·349	1·217	1·264	2·312	7·142	62·53	4·830	1,139,761	1·667	1·38
Pontypridd ...	355	...	...	12·16	11·99	2·78	·78	3·04	1·78	8·38	68·89	6·6	613,719	1·25	1·42
Rawtenstall ...	...	621	...	10·81	10·66	2·33	1·18	1·24	1·71	6·46	59·61	4·75	813,483	1·28	1·34
Rochdale... ...	8,490	...	...	11·163	11·123	2·520	·692	1·307	1·556	6·075	53·4	4·519	2,610,994	1·006	1·546
Rotherham ...	E. ...	4,287	750	12·54	12·52	2·92	·87	2·22	2·79	8·80	70·15	6·01	1,731,184	1·375	2·03
	R.T....	1,009	...	10·74	10·74	2·44	·76	2·68	1·23	7·11	66·20	5·88	120,303	1·375	1·07
Salford	...	...	22,000	10·501	10·499	3·059	·916	·970	1·936	6·881	65	4·945	9,812,392	1·23	1·606
Southampton ...	6,577	...	2,360	10·974	10·520	3·105	·779	1·432	1·915	7·231	66	5·316	2,004,408	1·5	1·29
Southend-on-Sea	2,514	1,000	6,000	13·14	12·97	3·03	·85	1·33	2·33	7·54	57·35	5·21	848,538	1·75	1·33
Southport ...	...	...	...	9·763	9·528	2·462	1·101	1·607	1·554	6·725	68·8	5·171	468,554	1·5	1·011
South Shields ...	(d) 500	4,907	1,700	10·244	10·087	2·362	·993	·971	1·710	6·036	58·92	4·326	1,105,203	1·388	1·231
Stalybridge, &c.	...	...	...	8·426	8·365	2·711	1·013	1·278	1·394	6·396	75·92	5·002	1,793,157	·9	1·549
Stockport ...	...	250	12,250	10·958	10·745	2·388	·738	1·618	·961	5·705	47·94	4·744	...	...	...
Sunderland ...	...	...	5,000	12·00	11·943	3·128	·844	1·034	1·799	6·805	56·97	5·0	1,804,219	1·5	1·19
Wallasey ...	1,443	3,000	7,750	11·844	11·739	3·287	·891	1·211	2·138	7·527	63·5	5·38	1,971,378	1·4	1·52
Walsall	1,480	...	1,000	11·234	11·007	2·675	1·068	1·561	1·905	7·209	64	5·304	845,654	1·68	1·176
Walthamstow ...	...	...	...	8·09	7·94	3·05	·66	1·53	1·76	7·00	86·6	5·24	1,495,460	1·375	1·28
Warrington ...	739	...	2,500	12·521	12·246	3·161	·966	2·096	1·798	8·021	68·273	6·223	545,817	1·5	1·199
West Ham ...	...	...	...	9·27	9·075	3·417	1·154	2·137	1·353	8·061	88	6·708	6,974,894	·75	1·85
Wigan	4,690	...	...	12·77	12·46	2·655	·836	1·862	1·761	7·11	56·07	5·35	2,216,740	1⅜	1·476
Wolverhampton	...	...	5,553	11·485	11·333	2·569	1·039	1·530	1·513	6·651	57·9	5·138	1,845,821	1	1·542
Yarmouth (Gt.)...	...	...	...	8·738	8·563	2·583	·616	1·016	1·649	5·864	68·48	4·215	758,296	1·56	1·052
York	...	2,524	...	9·08	8·86	2·95	·69	·66	1·78	6·08	67	4·30	1,009,827	1·25	1·43

TABLE II.—TOWNS WITH SEPARATE GENERATING STATIONS FOR TRACTION.

									*					Works Cost.	
Belfast	...	...	11,866	9·51	9·38	2·72	·44	1·46	·99	5·61	58·91	4·62	11,000,708	·617	1·37
Bexley	...	..	...	11·13	12·3	2·53	·85	2·82	·68	6·88	71·1	6·20	487,110	·827	1·66
Birkenhead ...	...	...	...	12·643	12·496	3·140	·991	2·170	1·336	7·637	60·33	6·30	2,672,599	·65	2·054
Bournemouth ...	...	2,000	...	12·83	12·76	2·95	1·02	1·26	(b) 1·99	7·22	56·21	5·23	3,245,277	·67	1·65
Cardiff	845	2,047	9,600	11·65	11·45	3·563	·900	1·468	·850	6·781	60	5·931	5,073,942	·488	1·71
Coventry ...	419	...	...	9·271	9·115	2·742	·953	1·694	·819	6·208	66·9	5·389	1,652,029	·544	1·47
Glasgow	...	...	53,892	10·659	10·609	3·271	1·318	1·536	·526	6·651	62·69	6·125	33,685,570	·378	1·38
Huddersfield ...	6,662	14,634	...	11·34	10·98	2·78	·61	2·72	·81	6·92	61·01	6·00	4,881,338	·42	1·94
Hull	...	7,270	7,000	9·47	9·41	2·85	·85	2·38	·67	6·75	71	6·02	5,710,219	·50	1·35
Leeds	...	...	70,005	11·145	11·042	2·967	1·073	1·070	·792	5·902	52·96	5·110	17,175,710	·493	1·801
Leicester... ...	...	...	10,000	9·801	8·785	3·232	·620	1·285	1·423	6·560	66	5·137	7,141,333	·411	1·77
London	...	...	...	E. 9·21	8·94	3·32	·76	1·41	1·01	6·50	70·55	5·49	154,048,461	·601	2·63
				H. 8·15	7·97	4·07	1·39	1·53	4·40	11·39	139·72	11·39	...	...	...
N'castle-on-Tyne	...	25,135	13,470	11·709	11·253	3·222	1·144	1·217	1·031	6·614	54·96	5·583	10,231,454	·421	1·922
Northampton ...	...	1,200	500	10·69	10·39	2·87	1·15	1·03	1·80	6·85	64	5·05	966,282	1·23	1·47
Portsmouth ...	10,702	(i) 3,000	5,000	11·204	11·030	3·033	1·057	·852	·576	5·518	49·25	4·942	3,056,720	·521	1·103
Preston	...	5,374	...	10·698	10·50	2·665	1·135	1·550	·600	5·95	55·63	5·35	1,516,545	·384	1·309
Reading	...	2,529	1,890	9·261	8·996	2·201	·933	1·042	·917	5·093	55	4·18	1,170,173	·737	1·12
Sheffield	7,032	2,000	30,581	10·527	10·431	3·286	·755	1·298	·949	6·288	59·732	5·339	18,601,705	446	1·933
Wellington, N.Z.	15,431	...	...	16·309	16·189	5·974	·801	2·259	1·850	10·884	65·86	9·034	4,769,149	·906	2·05

* The figures given under "Power" in Table II. include actual works costs only. H—Horse lines. E—Electric trolley system. (b) Including current supplied by Bournemouth and Poole Supply Company. (c) Horse account ·054d. (d) Accident, insurance, and compensation fund. (f) Insurance fund. (i) Including Insurance, (k) Insurance. (n) Remainder expended in paying capital expenditure not borrowed. (t) Amounts for 15 months.

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RECORDS OF ELECTRIC TRAMWAY ACCOUNTS.

Specially Compiled for "The Tramway and Railway World."

TABLE I.—TOWNS WITH COMBINED GENERATING STATION FOR TRACTION AND LIGHTING PURPOSES.

Name.	Population Served.	Car Mileage.	Passengers Carried.	Traffic Records. Passengers Carried per Car Mile.	Average Fare per Passenger. d.	Average Journeys per Head of Popular'n per Annum.	Average Car Miles per Day per Car.	Traffic Revenue per Mile of Single Track. £	Average Traffic Revenue per Annum per Head of Popular'n Served.	Operating Expenses per Passenger. d.	Average Distance of Id. Fare. Miles.	Average Fare Charged per Mile. d.	Average Speed per Hour. Miles.	Average Total Car Hours per Day.	Average Number of Cars in Use Daily.	Number of Cars in Stock.
Aberdeen ...	165,000	1,832,587	22,218,142	12·11	·91	134·6	93	3,064	10 3	·508	1·80	·58	7·5	703	54	77
Accrington...	45,525	573,536	4,938,979	8·72	1·377	109·8	105	3,033	13 1	·84	1·07	·929	7·5	250	18	27
Ashton-u-L.	50,000	464,160	5,053,701	10·888	·648	173·09	106	2,851	9/4	·368	1·223	·81	8	190	12	25
Ayr	33,000	444,802	4,238,494	9·52	1·04	128	102	1,953	11/1	·606	1·25	·75	8	168	12	22
Birmingham	868,430	14,268,244	146,930,986	10·29	1·03	169	79·77	5,482	14 5	·904	2·	·427	7·87	10·16	500	550
Blackburn ...	200,000	1,149,462	12,731,532	11·07	1·28	63·15	105	2,751	6/10	·88	1·25	·76	7·5	448	32	61
Blackpool ...	67,500	1,075,943	14,289,802	13	1·41	211·7	86·7	4,524	24/9	·73	...	...	8	..	34	78
Bolton ...	221,000	2,888,930	32,019,574	11·08	1·062	144·88	122·85	3,032	13/-	·578	1·553	·633	7·25	1,030	73	112
Bradford ...	370,000	6,255,878	67,675,166	10·816	1·058	182	113	2,792	16 2	·819	1·67	·531	7·3	2,340·5	151	248
Brighton ...	133,096	1,156,584	11,839,515	10	1·11	88·95	83·36	3,176	8/2	·86	1·27	·788	6·41	544	34	50
Burnley ...	175,000	1,754,811	17,668,834	10·07	1·18	101	120	3,971	10/1	·85	1·25	·83	7	874	46	67
Burton ...	48,000	439,248	3,339,184	7·60	1·058	70	...	1,782	6 3	·91	1·505	·58	7·5	...	...	20
Bury	128,202	1,631,126	15,831,487	10	1·06	123·5	98·80	2,028	10 10	·543	1·24	·85	8·51	483·83	45·26	54
Chester ...	39,028	347,260	3,217,899	9·26	·95	82·45	95	1,987	6/7	·606	1·27	·8	7	150·6	10·04	18
Chesterfield	50,000	304,376	2,950,774	9·7	1·1	76	122	2,668	5 5	·78	1·38	·75	7·33	126	7	17
Colchester ...	44,700	324,622	1,757,794	6·58	1·42	47·84	89·6	1,309	4/8	1·20	·85	·96	6·78	142·27	9·88	18
Croydon ...	178,094	2,801,302	19,227,878	6·87	1·06	107·66	129	4,818	9 10	·871	2·05	·50	8·14	942·23	59	75
Darlington...	60,000	385,999	4,140,269	10·7	·752	69	96·1	1,460	4/4	·53	1·219	·45	6·66	151·25	11	18
Darwen ...	...	366,912	2,993,697	11·22	1·25	...	...	2,182	...	·88	..	...	...	...	...	...
Derby ...	124,000	E 1,208,880 H. 17,710	12,136,148 110,231	10·039 6·224	1·011 ·935	97·88	...	2,398 ...	8/3 ...	·67 1·35	1·44 1	·75 1	6·375 ..	... ..	... ..	50 3
Doncaster ...	52,000	516,540	5,072,172	9·81	·952	97·54	103	1,591	7/8	·652	1·25	·76	7·5	218	16	25
Dundee ...	165,000	1,387,980	19,042,344	13·71	·853	115	...	2,387	8/2	·547	2	·50	7·3	...	...	68
East Ham ...	145,000	1,510,251	16,671,505	11·04	·78	115	150	3,704	7/1	·69	1·635	·634	7	216	32	45
Exeter ...	48,660	446,338	4,320,459	9·68	·97	88·8	82·125	2,498	7/2	·642	1·1	·902	5·76	228	16	20
Gloucester ...	53,972	638,646	4,415,555	6·9	·91	82	92·05	1,122	6/3	·75	1·5	·65	7·08	264·1	19	30
Halifax ...	176,000	2,242,086	20,276,077	9·04	1·26	115	80·21	1,958	12/4	·867	1·30	·87	7·23	853·93	77	101
Ilford ...	82,000	843,517	7,578,813	8·79	·831	92·42	...	2,312	5/1	·64	1·543	·69	8	...	..	26
Ilkeston ...	32,000	216,348	1,404,447	6·49	1·26	43·9	95	1,604	3/9	1·106	1·50	·633	7	93	7	13
Ipswich ...	75,681	668,650	5,715,035	8·54	·975	75·51	65·5	1,559	6/1	·84	1·53	·693	5·51	332·80	20·80	36
Keighley ...	43,000	242,500	3,099,272	12·8	·68	72·08	55·35	1,447	4/1	·462	2·22	·45	6·87	126	7	12
Kilmarnock	36,000	297,743	2,482,034	8·33	·875	68·94	93·12	1,632	5/-	·675	1·13	·86	7·22	109·14	8·76	14
Kirkcaldy ...	39,600	470,162	5,781,895	12·3	·726	146	52	1,989	8/10	·475	1·522	·64	7	185	17	22
Lancaster ...	41,786	174,752	1,603,321	9·17	·865	38·37	76	1,204	2/9	·785	1·71	·5	8	87·22	6·23	12
Leith ...	110,400	949,322	10,244,235	10·79	·86	92·8	125	2,031	6/8	·512	1·32	·72	8·3	314	21	37
Leyton ...	124,735	1,813,462	17,472,882	9·64	·950	140	120	3,820	11/1	·791	1·77	·95	8·25	14·5	40·0375	60
Lincoln ...	20,000	164,499	1,826,885	11·11	·907	91·34	65·7	2,350	6/11	·532	1·75	·428	7	90	5	8
Liverpool ...	839,000	13,442,605	144,085,927	10·72	1·129	172	77	5,695	16/2	·744	2·514	·39	7·5	4,920	480	595
Lowestoft ...	35,000	315,341	2,613,797	8	1·04	70	72	2,788	6/6	·764	1·5	·7	6·75	192	12	19
Maidstone ...	25,000	309,256	2,407,769	7·783	1·036	96·312	85	1,476	8/4	·725	1	1	6·8	133	12	19
Manchester	945,280	19,463,646	205,608,741	11	1·06	218	94·7	5,054	19/3	·683	...	...	..	...	...	662
Nelson ...	45,000	202,781	2,949,784	14·55	·88	65·55	92·59	2,796	4/9	·56	1	1	5·50	108	6	11
Newport ...	89,400	968,524	9,155,356	9·45	1·08	102·41	100	2,798	9/-	·904	1·164	·898	...	...	34	44
Nottingham	262,000	3,543,669	40,535,874	11·43	1·02	155	92·72	...	13/2	·642	1·70	1	6·86	...	105	135
Oldham ...	180,000	2,077,104	22,773,108	10·963	1·19	126·52	121	3,136	12/8	·825	1·11	·884	7	846	47	92
Perth... ...	35,900	252,940	1,813,228	7·16	1·15	50·5	96·25	1,298	4/7	·73	..	...	6·25	120	8	12
Plymouth ...	112,000	820,406	8,839,974	10·77	1·029	78·92	...	2,528	6/9	·663	..	...	...	...	..	42
Pontypridd...	40,000	432,006	5,047,168	11·68	1·02	126	81·2	2,509	10/9	·71	1·25	·81	6·5	221	17	26
Rawtenstall	50,000	604,807	5,201,893	8·60	1·22	104	138	1,691	10/9	·751	1·12	·88	9	247·5	15	24
Rochdale ...	130,000	1,778,030	14,584,777	8·16	1·36	112·2	114·90	2,079	12/9	·731	1·07	·90	7·66	660	44	69
Rotherham...	64,000	E 852,639 RT 128,685	9,874,231 471,690	11·58 3·67	1·08 2·72	154·3 ...	... ...	3,701 ...	13/9 1·92	·76 ..	... ..	... ..	... ...	... ...	... ...	... ...
Salford ...	350,000	6,235,278	53,124,546	8·52	1·227	151	108	3,646	15/7	·88	2·20	·48	7·916	2,054	158	200
Southampt'n	122,200	1,543,941	13,162,224	8·52	1·23	108	77·38	3,624	11·1	·82	1·25	·55	...	...	...	70
Southend ...	78,000	637,366	7,581,104	11·89	1·09	97·2	87	4,708	8/10	·634	1·41	·76	6·5	357	21	31
Southport ...	31,312	463,262	4,663,579	10·067	·94	148·62	98	1,710	11/5	·677	1·6	·62	6·66	825	15	26
So'th Shields	111,357	898,015	10,005,164	11·414	·905	90	110	3,677	6/9	·54	3·1	·38	8·06	338	20	35
Stalybridge	94,063	1,157,163	9,900,591	8·556	·977	105·3	79	1,698	8/7	·748	1·22	·72	6·8	466	40	59
Stockport ...	120,000	1,490,116	...	...	...	...	...	2,356	11 2	...	...	...	..	..	...	...
Sunderland ...	170,000	1,504,356	18,475,671	12·2	·972	108·6	78·4	3,679	8/9	·554	1·34	·68	7	688	43	70
Wallasey ...	84,500	1,291,046	13,105,204	10·15	1·15	155	99·6	3,163	14/11	1	1·89	·54	7	525	48	61
Walsall ...	100,000	719,372	6,121,381	8·509	1·293	61	86	1,885	6/7	·847	1·24	·79	7	345	23	39
Walth'mst'w	130,000	1,166,027	12,579,852	10·788	·736	96·76	95	2,883	5/11	·65	1·18	·86	7·5	430	37	38
Warrington	86,000	455,304	6,134,545	13·473	·909	71·332	102·423	2,406	5/5	·59	1·246	·803	6·401	194·86	12·179	21
West Ham ...	296,600	3,756,354	41,152,502	10·95	·828	138	92	4,726	9/7	·73	1·80	·81	7·75	1,235	95	118
Wigan ...	200,000	1,500,846	14,295,274	9·52	1·308	71·47	93·45	2,525	7/9	·74	1·15	·88	7·4	605	44	67
Wolverh'ton	135,000	1,195,326	12,616,881	10·555	1·07	93·44	89	2,625	8/4	·631	1·25	·879	6·85	660·6	36·7	52
Yarmouth ...	56,000	720,702	4,930,728	6·84	1·231	88·05	79	1,746	9/2	·857	1·25	·76	7	375	25	35
York	82,600	707,370	5,946,843	8·41	1·05	72	108	2,193	6·2	·73	1·33	·789	8	270	18	31

TABLE II.—TOWNS WITH SEPARATE GENERATING STATIONS FOR TRACTION.

Belfast ...	390,000	6,865,691	63,131,820	9·19	1·02	162	128	2,709	13/9	·61	1·96	·43	8·75	2,350	257	289
Bexley ...	16,500	316,970	2,270,070	7·16	1·55	133	126	2,922	19/10	1·24	1·59	·63	9·5	179	11	16
Birkenhead	135,740	1,300,717	15,167,958	11·66	1·071	111·74	69·98	2,811	9·11	·71	1·39	·66	6·84	520·61	50·94	65
Bournem'uth	120,000	1,962,352	17,162,844	8·76	1·46	143	95	3,505	17·5	·824	1·19	·87	6·8	1,140	60	81
Cardiff ...	182,729	2,966,230	31,122,962	10·49	1·09	170	98·5	4,447	15 6	·65	1·44	·736	7·5	1,264	79	130
Coventry ...	135,000	1,125,705	8,407,719	7·5	1·22	62	66	2,714	6·4	·831	1·18	·866	6·4	476	40	46
Glasgow ...	1,150,000	24,403,482	336,654,624	13·795	·769	292·74	106·18	5,499	18·9	·482	2·31	·44	8·13	8,815 65	629·69	851
Huddersfield	160,000	(a) 2,461,107	22,616,710	9·21	1·19	174	82	3,634	14/1	·766	1·35	·71	7·62	885·28	55·33	96
Hull	291,118	4,229,625	45,679,094	10·08	·871	156·91	127·60	5,004	11/3	·603	2·75	·364	9	1,453·12	90·82	160
Leeds ...	525,000	9,204,331	93,673,774	10·17	1·081	178	115·41	3,694	16/2	(b) ·916	1·93	·539	7·56	3,339	222	318
Leicester ...	230,970	4,028,542	37,073,717	9·202	·954	161	...	3,985	12/9	·712	2·18	·984	8	...	...	170
London ...	...	E58,572,356 H 636,933	516,338,859 6,613,781	8·82 10·38	1·01 ·77	...	120·18 77·12	7,866 1,519	... ...	·73 1·09	... ...	... ...	9·05 5·85	17,728·8 205·14	1,335 23	1,722 56
Newcastle ...	300,000	5,353,875	57,840,666	10·81	1·071	193	100	3,992	16/9	·612	1·58	·633	7·5	14·40	133	200
Northampt'n	91,500	658,809	7,307,863	11·09	·94	82·73	...	3,102	6 4	·617	1·34	·7	...	...	...	26
Portsmouth	245,827	2,506,058	26,266,342	10·481	1·052	106·85	90·34	3,325	9/5	·527	1·66	·62	7	1,140	76	100
Preston ...	120,000	970,719	9,567,366	9·85	1·06	79·73	132	2,498	7 2	·603	1·01	·95	7·36	...	...	33
Reading ...	76,500	941,303	8,865,128	9·42	·97	116	110·5	2,680	9 2	·54	1·59	·68	7·5	352	26	36
Sheffield ...	479,622	8,883,576	104,851,408	11·803	·884	218·594	104·644	4,885	16/1	·533	2 789	379	...	3,372·5	232·587	335
Wellington...	70,000	2,328,849	24,565,376	11·28	1·43	359	85	4,708	44/10	1·031	1·125	·89	7·59	840	75	92

E—Electric trolley system. H—Horse lines. (a) Including 9,395 miles coal haulage. (b) Total expenses per passenger.

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TRAMWAY CHAIRMEN FOR 1914-1915.

Municipal Tramway Committees have now been constituted for the ensuing year, and we append a list of chairmen and vice-chairmen. An asterisk indicates that the chairman or vice-chairman has been newly appointed.

Town.	*Chairman.*	*Vice-Chairman.*
Aberdare	*Councillor Owen Powell.	
Aberdeen	*Councillor Robertson.	
Accrington	Alderman Higham	Councillor Morley.
Ashton-under-Lyne	Alderman R. S. Oldham	Alderman Waterhouse
Ayr	*Councillor J. R. Learmont	*Bailie Murray.
Bacup	Alderman Maden	*Councillor J.H.Lord(Mayor).
Barking	*Councillor D. Gordon.	
Batley	Councillor J. W. Turner	*Councillor F. W. H. Auty.
Belfast	Alderman Sir Robert Anderson	Alderman J. S. Finnigan.
Bexley	*Councillor E. T. Coote.	
Birkenhead	Councillor H. Halsall.	
Birmingham	Councillor H. Barrow.	
Blackburn	Alderman W. Thompson (Mayor)	*Councillor C. Higham.
Blackpool	Alderman J. Brodie	Councillor Holt.
Bolton	Alderman J. Miles	Councillor P. Higson.
Bootle	Alderman Booth	Councillor Pennington.
Brighton	Alderman F. T. Wilson.	
Burnley	Councillor E. Heap	Councillor D. D. Irving.
Burton-on-Trent	Alderman J. S. Rowland	Alderman T. E. Lowe.
Cardiff	Alderman Sir J. W. Courtis	Councillor A. J. A. Stone.
Chester	Alderman J. Jones	Councillor J. Dodd.
Chesterfield	Alderman Shentall (Mayor)	*Councillor Woodhead.
Colchester	Councillor A. M. Jarmin	Councillor J. T. Bailey.
Croydon	Alderman G. J. Allen	Councillor J. O. Pelton.
Darlington	*Councillor C. W. Starmer.	
Dartford	Councillor S. K. Keyes	Councillor R. Bennett.
Darwen	Alderman Jas Tomlinson	Councillor G. P. Holden.
Derby	*Councillor Dean.	
Dover	Councillor E. E. Chitty	Councillor Barwick.
East Ham	*Alderman Murrell Oakes.	
Exeter	Councillor T. Linscott	Alderman H. B. Varwell.
Farnworth	Councillor Richardson	Councillor Stones.
Glasgow	Councillor R. Kirkland	Councillor J. Alston.
Haslingden	Councillor Waddington	Councillor Haworth.
Heywood	Councillor J. Ashworth	Alderman T. Popple.
Huddersfield	Alderman J. H. Aston	Councillor J. Barlow.
Hull	Councillor J. H. Hargreaves (Lord Mayor)	Councillor W. Wheatley.
Ilford	*Councillor W. J. O. Sheat	*Councillor Owen Waters.
Ilkeston	*Councillor W. Smith	*Councillor Middleton.
Keighley	Councillor A. Smith.	
Kilmarnock	*Councillor Jones.	
Kirkcaldy	Councillor Fergusson.	
Lancaster	Councillor T. Wilkinson.	
Leeds	Alderman R. A. Smithson	Alderman H. Brown.
Leicester	Alderman G. Flint	Alderman G. Banton.
Leyton	Councillor H. Heather.	
Lincoln	Alderman W. S. White	Councillor Ashley (Mayor).
Liverpool	*Councillor E. Russell Taylor	*Alderman F. Smith.
Lowestoft	Councillor F. Spashett.	
Maidstone	Councillor Lyle	Councillor Green.
Manchester	Alderman J. Bowes	Councillor A. W. Chapman.
Middleton	*Alderman Wood (Mayor).	
Nelson	Councillor W. F. Cooke.	
Newcastle	Alderman J. H. Rodgers	Councillor R. Mayne.
Northampton	Councillor T. D. Lewis	Councillor W. Beale.
Nottingham	Councillor R. H. Swain	Alderman F. R. Radford.
Oldham	Alderman F. G. Isherwood	*Councillor J. K. Cheetham.
Perth	Councillor Calderwood.	
Plymouth	Alderman S. H. Phillips	Councillor J. Moon.
Pontypridd	Councillor W. Phillips.	
Portsmouth	Alderman J. H. Corke (Mayor)	Councillor J. Timpson.
Preston	Alderman J. Ormrod	Councillor T. Parkinson.
Radcliffe	Councillor Walker Allen.	
Rawtenstall	Alderman H. Coupe	Councillor J. W. Stansfield.
Rochdale	Alderman Taylor.	
Rotherham	Alderman D. L. Winter	Councillor T. Reeves.
St. Helens	Alderman Sir J. Beecham.	
Salford	Alderman H. Linsley	Councillor W. H. Barrett.
Sheffield	Alderman Sir W. Clegg	Councillor A. T. Bescoby.
Southampton	Alderman F. A. Dunsford.	
Southend	Alderman A. Martin.	
South Shields	Alderman W. G. Wylie	Alderman J. W. Henderson.
Stockport	Alderman C. Sharples	Alderman W. E. Hamnett.
Sunderland	Councillor G. New	Councillor W. Walker.
Swindon	*Councillor T. C. Newman	*Councillor J. J. Shawyer.
Walsall	Alderman J. Cope	Alderman J. Williams.
Walthamstow	Councillor E. Samuels.	
Warrington	Councillor Dr. Joseph	Councillor J. Wilkinson.
West Bromwich	Alderman A. G. Turley (Mayor)	Councillor G. Garratt.
West Ham	Alderman H. W. Littler.	
West Hartlepool	Councillor Martin	Councillor Charlton.
Wigan	Councillor R. T. Fletcher	Councillor Jas. Walkden.
Wolverhampton	Alderman Sir C. T. Mander	Alderman S. Craddock.
York	Alderman S. W. Meyer.	

Lancashire and Cheshire Municipal Tramway Managers' Association held a meeting at the Victoria Hotel, Manchester, on Friday, October 30, when the following were present: Mr. Alderman Linsley (president M.T.A.); Messrs. W. Clough (Bury) in the chair; J. Barnard (Bolton); J. W. Dugdale (Oldham); J. S. Hosken (Darwen); H. Pilling (Accrington); F. Schofield (Stalybridge); J. F. Simpson (Preston); C. L. E. Stewart (Rawtenstall); and G.W. Holford (Salford), honorary secretary. Various matters of interest were discussed. The members learned with much regret of the death of Lieutenant Brockman, R.N., who escorted them over the dockyards when they visited Plymouth a few months ago.

PERSONAL.

Mr. H. Wilmer has succeeded Mr. Harry Jones as chief engineer of the Great Eastern Railway.

Mr. H. H. Gordon has resigned his membership of the L.C.C. Committee on London Electricity Supply.

Mr. J. J. Easton has joined the board of directors of Messrs. Siemens Brothers and Company, Limited.

Mr. J. W. Burr, deputy electrical engineer of Croydon, has been appointed borough electrical engineer of Swansea, at a salary of £500 per annum.

Colonel Chas. William Trotter, of London, has been elected chairman of the Hull and Barnsley Railway Company, and Mr. J. H. Fisher, of Hull, vice-chairman.

Mr. A. E. White, who has been city electrical engineer of Hull for many years, and was responsible for the installation of the Hull Corporation tramways, has retired.

Mr. H. Ramsbottom, late of the Continental Tyre Company, has been appointed by the Avon India Rubber Company, Limited, as another representative for Lancashire to assist Mr. W. Bray.

Mr. P. H. Marco, general manager of the Barnsley and District Electric Traction Company, Limited, has received a commission as lieutenant in the Barnsley Battalion of the York and Lancaster Regiment.

Mr. W. B. Nantel has been appointed a member of the Canadian Railway Commission, in succession to Mr. N. E. Bernier. The commission has certain duties in connection with electric railways and tramways.

Mr. Arthur Coveney, who has been manager of the Erith tramways since their inception in 1905, and chief engineer of the Erith Council's electricity works during the past four years, has resigned these positions on accepting another appointment.

Mr. F. A. Yerbury, who has recently returned from Vancouver, and was formerly with the Mirrlees Watson Company, has become director and manager of the sales department of the Premier Cooling and Engineering Company, Limited, Broadway Court, Westminster, S.W.

Mr. P. Walter d'Alton, M.Inst.C.E., M.I.Mech.E., M.I.E.E., for many years chief mechanical engineer on the staff of Messrs. Dick, Kerr and Company, has opened offices at Cross Keys House, 56-58, Moorgate Street, E.C., and begun practice as a consulting and inspecting engineer.

Mr. F. Riley, power-station superintendent of the Rawtenstall electricity works, has been appointed resident engineer to the new Whalley Asylum at a salary of £275 per annum. There were 470 applicants for the position. Mr. Riley was previously with the Stalybridge, Hyde, Mossley, and Dukinfield Tramways and Electricity Board.

Mr. William C. May, who has been appointed chief traffic manager to the Great Eastern Railway, will have control of the whole of the passenger, goods, and mineral traffic. Mr. May, who was born in 1869, was educated at Cranleigh School, and entered the service of the Great Eastern Railway in 1886. Seventeen years later he was appointed mineral manager, and goods manager in 1910.

Mr. J. A. Panton, who is a well-known expert in connection with electric rolling stock and permanent way equipment, has opened offices at Canadian Buildings, 7 and 9, James Street, Liverpool. Local works in London and Liverpool are now under his personal supervision, in connection with the manufacture of the latest ferro-manganese brake blocks, electric steel castings, and other approved appliances.

Mr. Andrew Nance completed his 33rd year as manager of the Belfast Tramways on November 30. He first assumed the management of the undertaking for the Belfast Tramways Company, and when the Corporation purchased the system he was appointed general manager. Subsequently he superintended the electrical equipment of the lines. Mr. Nance is now probably the senior (in service) tramway manager in the world.

Mr. C. Higham, after an absence of 12 months, has been re-elected a member of the Blackburn Town Council. On Mr. Higham's retirement, Mr. Alderman A. Nuttall, J.P., was appointed vice-chairman of the Electricity and Tramways Committee in his stead. The latter has now relinquished the post, in order to allow Mr. Higham to take over his former position. Alderman W. Thompson, chairman of the Electricity and Tramways Committee, has been appointed Mayor of Blackburn.

Mr. Charles Challenger has been for 40 years in the service of the Bristol Tramways and Carriage Company, and holds a premier position in Great Britain as long-service tramway manager, covering a period of over 35 years. On the outbreak of the war Mr. Challenger was appointed to take charge of the Bristol Red Cross transport, and this has resulted in the successful dealing with over 1,000 sick and wounded soldiers arriving in Bristol. For upwards of three years

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Mr. Challenger, as commandant of the tramways detachment of the Bristol branch of the British Red Cross Society, has conducted a weekly class for training in first aid and transport work. The class has been greatly encouraged by Sir George White, Bart.

Mr. P. D. Thomas, I.S.O., who has for many years been in the service of the Board of Trade, is now about to retire from that department. The Municipal Tramways Association and the Tramways and Light Railways Association have jointly sent to the President of the Board of Trade the following letter: "We are instructed on behalf of the Executive Committees of our two Associations to say that they are anxious to avail themselves of this opportunity to express to you, sir, on behalf of all their members, their very sincere appreciation of the never failing courtesy and kindness which they have at all times received at the hands of Mr. Thomas, and to place on record their regret that his long and faithful services as a public servant should be coming to an end." The letter is signed on behalf of the Councils of the Associations by Mr. A. de Turckheim, secretary of the Tramways and Light Railways Association, and Mr. C. J. Spencer, hon. secretary of the Municipal Tramways Association.

Mr. J. Gottschalk.—The Northampton Tramways Committee have received the following letter from Mr. J. Gottschalk, who, under circumstances that are well known, recently resigned the management of the tramways:

"In closing my management of the Northampton Corporation Tramways, I desire to express to you my most sincere thanks for the kindness and appreciation I have received from you at all times. Although on many occasions my opinion has not coincided with the opinions of some members of the committee, I have always tried to act fearlessly but considerately, and in this I hope I have succeeded. I am proud to think that the tramways under my management have been extremely successful, thanks in a large measure to the great help I have received from an efficient and loyal staff. I deeply deplore the circumstances which necessitate my leaving the work I have always loved, and I can only conclude with the earnest hope that the undertaking will continue to prosper."

The committee reported that they had accepted the resignation with regret, and in accordance with the resolution of the Council the borough accountant will be instructed to pay to Mr. Gottschalk the sum of £300 out of the reserve fund of the undertaking.

RAIL CLEANING.

The Peacock Brake Company have sent to us an interesting leaflet on "Rail Cleaning," referring particularly to the Q-Fel rail cleaner. As an introduction, it is stated that in their larger booklet, "Rail Cleaning," the assertion was made that in the near future much closer attention would be given to the systematic cleaning of tramway rails. That this assertion has been fully justified is shown by the figures representing the total wearable length, expressed in car-miles, of the blades, which has increased from 867,000 in 1912 to 1,841,000 for the first eight months of 1914. It is pointed out that a tramway having 25 miles of single track or its equivalent can be cleaned regularly once a day and six times a week at a cost for blades alone of £4 8s. 6d. per annum. It is stated that about sixty of the tramways in the British Isles are using Q-Fel cleaners, the undertakings varying in size from Lincoln to Leeds. Many of them have from three to seven sets in regular operation. In the Colonies and in foreign countries the demand is steadily increasing, and during the few weeks preceding the outbreak of war orders were received from Astrakhan, Kischineff, Taschkent, Lille, Lisbon, etc., and repeat orders from Melbourne, Salonica, and Santos. The value of the cleaners is indicated by the fact that cabled orders are often received from far distant tramway managers who have made a trial of a single equipment. Among the undertakings which have sent cabled repeat orders are the Anglo-Argentine Tramways Company, of Buenos Ayres, for two additional sets of cleaners and 48 spare blades, and the Prahran and Malvern Tramways, of Australia, for one additional set of cleaners and 24 spare blades. Pretoria has ordered an additional one and a half sets and 84 blades, while the last order for Santos, Brazil, was for a fourth set of cleaners and 100 spare blades. The blades on this last order alone represent the cleaning of 30 miles of single track no fewer than 1,000 times. The pamphlet contains a description of the Q-Fel rail cleaner, and it should be in the hands of every tramway manager.

Concession for a Tramway in Spain.—The "Board of Trade Journal" states that a concession has been granted to Don José F. Solorzano y Frure for the construction of a tramway from Ferrol to Santa Maria de Neda.

New Members of the B.E.A.M.A.—Messrs. Ashworth and Parker, Greenwood and Batley, Limited, and Sandycroft, Limited, have been elected members of the British Electrical and Allied Manufacturers' Association. The Harland Engineering Company has been elected an associate.

Mexican Tramways Company.—The London Office of the Mexico Tramways Company have received advice that the intervention of the Mexican Government in the affairs of the company is likely to continue for an indefinite period, and that it is rumoured that the Government intend to appoint a commission to study the company's franchises.

NEW CONTRACTS AND ORDERS.

C. Macintosh and Company, Limited, have an order from Manchester Electricity Committee for one mile of 37/15's cable.

Burnley Electricity Committee have placed an order with the British Insulated and Helsby Cables, Limited, for the supply of cables.

Walsall Corporation have accepted the tender of A. Reyrolle and Company, Limited, for extra high and low-tension switch gear at £2,460.

Messrs. Estler Brothers have received an order from Manchester Tramways Committee for steel storage shelving for the Hyde Road car depot.

Melbourne City Council have accepted the tender of the British Westinghouse Electric and Manufacturing Company for new blading for the 750-KW. S.P. turbines.

Siemens Brothers Dynamo Works, Limited, have obtained the contract for the supply of "Tantalum" lamps for the Walsall Corporation tramways department.

Anger Brake Adjuster.—The trucks for the six new cars now being built by the Brush Company for the Wallasey Corporation are being equipped with the Anger improved automatic brake adjuster.

Titan Trackwork Company, Limited, have recently received orders for special junctions in manganese steel for Leeds Corporation Tramways, a car shed lay-out for Preston Tramways, and special trackwork for the Glasgow and the Sheffield Corporation Tramways.

The Anger Manufacturing and Supply Company have recently received large orders for axles and nave plates or flanges from the War Office. They also have orders from several large motor car and other companies, who are building complete wagons for pontoon and limber requirements.

Leicester Tramways and Electricity Committee have placed an order with the Wilson Rolling Shutter Company for three rolling steel shutters for the car repair depot, and with Messrs. A. L. Gibson and Company, of Twickenham, for 12 rolling steel shutters for the generating station extensions.

Cammell, Laird, and Company, Limited, have an order from Sheffield Corporation Tramways for 50 special tramcar tires at 31s. each, and from the Dart Motor and Transport Company for a 15-H.P. Armstrong-Whitworth motor chassis for the tramways department at £375, with an additional 5 per cent. for contingencies.

Glasgow Works Sub-Committee of the Tramways Committee have accepted the following tenders: Traction street poles, Stewarts and Lloyds, Limited; trolley feeder cable, St. Helens Cable Company; steel plates for manholes, W. Baird and Son; special trackwork, Titan Trackwork Company, Limited, Edgar Allen and Company, Limited, and Hadfields, Limited; cast-steel pipe connections for Pinkston, Stewarts, and Lloyds, Limited.

The Mirlees Watson Company, Limited, have recently received orders for condensing plant from the following:

Gravesend Corporation, Devonport Corporation, Manchester Corporation, Leeds Corporation, Dartford Urban District Council, County Borough of Hampstead, Wombwell Main Colliery Company, Limited, Hulton Colliery Company, Limited, Rockingham Colliery, Moira Colliery, Bestwood Coal and Iron Company, Limited (per Fraser and Chalmers), John Glen and Sons, Caldercruix (per Greenwood and Batley), Marley Hill Colliery (per C. A. Parsons and Company), Kirkby Colliery, Ormonde Colliery, Stanton Iron Works Company, Sanquhar and Kirkconnel Collieries, Limited, Clifton Colliery, North Bitchburn Coal Company, Limited, Millom and Askam (per Fraser and Chalmers), India Rubber and Gutta Percha Company, Limited, Hubert Davies and Company, Limited (for Messina Mines), Nobel's Explosives Company, China Light and Power Company.

BUSINESS NOTICES.

The J. G. Brill Company, 110, Cannon Street, E.C., inform us that they are at the present time holding large stocks of woven cane for tramway and railway carriage seats. This can be supplied both lined with canvas and unlined. The shortage in the usual supplies finds them well equipped for executing orders for this material.

The General Seating Company, Limited, of 13, City Road, London, E.C., ask us to mention that they have large stocks of raw materials for the manufacture of woven rattan, in twill, straight, and fancy weaves, canvas backed and unbacked. The woven material can be supplied in natural, glaze, dull finish, or colours, and is manufactured in England by British labour.

The Ailsa Oilskin and Rubber Company are much occupied at the moment with work necessarily delayed in carrying out orders for garments for the forces. They are, however, working night and day, and they ask us to mention that they have considerably increased their staff and hope soon to overtake the work in hand. All orders are receiving careful attention systematically in their due order. The Ailsa Company feel sure that if customers understand the circumstances they will exercise a litttle patience at the present time.

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TRAMWAY AND LIGHT RAILWAY NOTES.

ABERDEEN.

THE CORPORATION AND THE SUBURBAN TRAMWAY COMPANY.

The Town Council has before it the question of the purchase of the Aberdeen Suburban Tramways Company, and in the meantime consideration of the proposal to discontinue the agreement between the Town Council and the tramways company has been deferred. Mr. R. S. Pilcher, general manager of the Corporation Tramways, has been directed to submit a report on the proposed purchase of the undertaking.

BLACKPOOL.

JOINT PARCELS SYSTEM ON CORPORATION AND COMPANIES' LINES.

A system of parcels delivery is to be introduced on the Blackpool, the Blackpool and Fleetwood, and the Blackpool, St Anne's, and Lytham tramways. The weight of parcels must not exceed 28 lbs.

BRIGHTON.

LOAN FOR EXTENSIONS.

Brighton Tramways Committee recommend the Corporation to apply for sanction for a loan of £4,000 for extensions and tramway improvements.

CARDIFF.

FRONTAGERS BLOCK TRAMWAY IMPROVEMENT.

Sir John Courtis, chairman of the Tramways Committee, replying to a question at a meeting of the Cardiff Council on November 9, said that the committee had not abandoned their intention to double the tram line in Newport Road, but they had had considerable difficulty in acquiring the strip of land required for the undertaking. The owners imposed prohibitive terms, and the only thing left for the Council was to apply for compulsory powers. The ground landlord, Lord Tredegar, was willing to meet them, but the leaseholders blocked the way.

DEARNE VALLEY.

LIGHT RAILWAY SCHEME AS APPROVED.

This light railway scheme, which, as already reported, has been finally approved by the Light Railway Commissioners, provides in the form in which it has been passed for the construction of about 16 miles of line. The main route will be between Barnsley and Mexborough, with branch lines to Thurnscoe and Swinton. The opposition to the scheme was very strong, and the promoters, who are the Urban Councils of Wombwell, Wath-on-Dearne, Bolton-on-Dearne, and Thurnscoe, are well satisfied with the result, as out of 22 sections originally proposed 20 have been authorised.

CHELTENHAM.

PRICE OF ENERGY.

The Cheltenham and District Light Railway Company have recently made a new arrangement with the Corporation for the supply of electrical energy. In future the company will pay 1·25d. per unit for the first 400,000 units per annum, 1·20d. for the next 100,000 units, 1d. per unit for the next 100,000 units, and ¾d. per unit for any additional amount above the 600,000 units per annum.

DUNDEE.

ACETYLENE WELDING PLANT.

Dundee Corporation Tramways propose to purchase an acetylene welding plant at a cost of about £80, and a similar plant for rail cutting at £40. Mr. Peter Fisher, the manager, recently reported to the Tramways Committee that the cost of working would amount to 11s. 4d. per joint.

EAST AND WEST HAM.

REDUCTION OF ASSESSMENT.

By revision of the assessment of the tramways undertaking, a saving of £1,469 will accrue to the East Ham tramways department. The assessment has now been fixed at a net rateable value of £4,000. The change takes place as from April 1 last, and will remain in force until September 30, 1915. A reduction has also been granted in the case of the West Ham Corporation Tramways.

LIVERPOOL.

ELECTION OF A NEW CHAIRMAN OF THE TRAMWAYS AND ELECTRICITY COMMITTEE.

At the first meeting of the newly-constituted Tramways Committee, Mr. E. Russell Taylor was elected chairman, and Mr. Fred Smith, who has been chairman for the past two years and deputy-chairman for many years previously, having consented again to become deputy-chairman, was elected to that position. The Lord Mayor, in welcoming Mr. Russell Taylor to the chair, said that he would certainly have golden opportunities for the display of forbearance, tact, and impartiality. He would have a gigantic undertaking to deal with, and there was scope for all the ability members could possibly bring to bear.

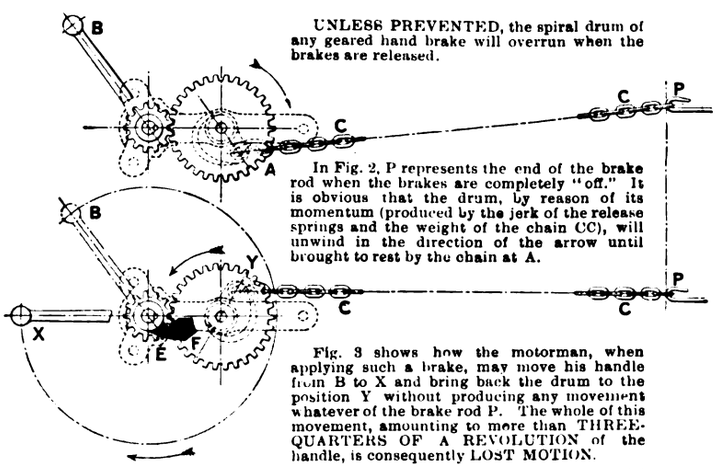
LONDON.

DISAPPEARING HORSE TRAMWAYS—HALFPENNY FARES FOR CHILDREN.

Horse traction on the London County Council Tramways, which has been slowly diminishing since 1903, has now almost disappeared. Early in August of this year 4·07 miles of route were still worked by horses, but a few days later, the conversion of a line to the electric

THE "PEACOCK" IMPROVED BRAKE

(PATENT).



UNLESS PREVENTED, the spiral drum of any geared hand brake will overrun when the brakes are released.

In Fig. 2, P represents the end of the brake rod when the brakes are completely "off." It is obvious that the drum, by reason of its momentum (produced by the jerk of the release springs and the weight of the chain CC), will unwind in the direction of the arrow until brought to rest by the chain at A.

Fig. 3 shows how the motorman, when applying such a brake, may move his handle from B to X and bring back the drum to the position Y without producing any movement whatever of the brake rod P. The whole of this movement, amounting to more than THREE-QUARTERS OF A REVOLUTION of the handle, is consequently LOST MOTION.

The stops EF, which form the special feature of the "Peacock" IMPROVED Brake, eliminate this lost motion altogether by stopping the drums ALWAYS at Y, which is the most favourable position for a quick recovery of chain.

The "PEACOCK" BRAKE CO., 27, Clements Lane, LONDON, E.C.

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system having been completed, the length worked by horses was reduced to 1·77 miles. The route length of electric tramways now amounts to 140·83 miles, so that, including the horse tramways, the Council has a total of 142·60 miles of route.—The London United Tramway Company have granted a popular concession in the form of halfpenny fares for children under 12 years of age. The cheap tickets are issued between 8-30 a.m. and 5-30 p.m., except on Wednesdays and Saturdays, when cheap tickets are issued up to 2 p.m. only.

NORTHAMPTON.

NEW TOP-COVERED CARS.

The first of the seven new cars recently ordered by the Northampton Corporation Tramways have been received. They provide accommodation for 56 passengers, and have an enclosed upper deck with sliding windows on the rack and pinion system. The interior woodwork of the car is of English oak, ash, and pine. Non-slip steps are provided, and there is an up-to-date system of ventilation.

ROTHERHAM.

THROUGH RUNNING.

Rotherham Town Council propose to seek powers in the next session to provide for the compulsory through running of cars between Sheffield and Rotherham. The bill will also include proposals for the doubling of certain tracks, the running of motor omnibuses, and to authorise the chairman of the Parlimentary Committee and Alderman Winter to negotiate with the West Riding County Council with a view to obtaining their consent to the construction of the proposed tramway over their roads.

STIRLING.

PETROL-DRIVEN CARS.

Presiding at the annual meeting of the Stirling and Bridge of Allan Tramways Company on November 9 last, Mr. H. F. Brand, the chairman, said that the company had been experimenting for about a year with a petrol-driven tramcar, the first of its kind in Scotland. The car had proved an unqualified success, and it had been the intention of the company to proceed with a Provisional Order to authorise the general substitution of mechanical traction for the present horse haulage, when Stirling Town Council entered into negotiations with them regarding a proposal that the Corporation should take over the tramway system and electrify it. These negotiations had been postponed by reason of the outbreak of the war, but he had no doubt that when hostilities had ceased the parties would get together again. Meanwhile the company had obtained the extension of the licence permitting them to experiment with the petrol tramcar for another year, and in the coming year they would consider in good time regarding what was to be done. As showing the success which had attended the running of the petrol tramcar it was mentioned that the passengers carried on the St. Ninians section, where the new car was in constant use, had increased by no fewer than 24,300.

PATENT LIST.

Specially abstracted for "The Tramway and Railway World" from the Official Journal of Patents.

*** If the inventions have been communicated the names of the communicators are given below in italics.

APPLICATIONS.

The following Application for Letters Patent have been filed:

21,527 Motor vehicles—J. C. G. Sperni.
21,551 Metallic railway tie and fastening—A. F. Brown.
21,557 Rail joints—J. W. Cook.
21,561 Brake valve mechanism for use in connection with control systems, etc.—J. Cowell, junr., and T. McCaughan.
21,622 Locking devices for railway and tramway points—R. Jones.
21,676 Dynamo-electric machines—British Thomson-Houston Company, Limited *(General Electric Company)*.
21,736 Construction of railway and tramway vehicles—W. M. Smith.
21,764 Controlling device for carburettors for motor-vehicle engines—Albion Motor Car Company, Limited, and T. B. Murray.
21,788 Token instruments for use on single lines—Railway Signal Company, Limited, and W. S. Roberts.
21,825 Dynamo-electric machines—British Thomson-Houston Company, Limited *(General Electric Company)*.
21,866 Variable gearing for automobiles—A. Walker.
21,891 Electric conductors—British Thomson-Houston Company, Limited *(General Electric Company)*.
21,914 Radiator tube for motor vehicles—H. Smethurst and T. Mullineaux.
22,026 Non-skidding brake for motor vehicles—B. Harris.
22,027 Device for lubricating petrol engines—J. S. Knight.
22,042 Apparatus to control the voltage of generators—G. Inrig.
22,050 Toothed gear wheels—British Insulated and Helsby Cables, Limited, and J. Tennant.
22,062 Electric generators for lighting mechanically-propelled vehicles—H. C. H. Smyth.
22,073 Signalling apparatus—E. F. Kelaart.
22,109 Automatic safety railway-signalling system—A. E. Hensher.
22,113 Overhead arrangements for use at cross-overs or switches on electric trolley lines—C. B. Burdon *(Siemens-Schuckertwerke, G.m.b. H.)*.
22,114 Sanding apparatus—F. J. Gresham.
22,117 Pneumatic-dynamic railway cars for moderating the shock of railway collisions—P. Penza.
22,119 Electric cables—W. C. Knight and Callender's Cable and Construction Company, Limited.
22,131 Dynamo-electric machines—British Thomson-Houston Company, Limited *(General Electric Company)*.
22,132 Couplings for railway vehicles—G. M. Clark *(A. M. Bell)*.
22,176 Mounting indicating-instruments in switchboards, more particularly used on motor cars, etc.—C. A. Vandervell.
22,199 Electric signals—A. C. Brown.
22,229 Self-acting and self-regulating brake mechanism—C. F. Parker.
22,231 Trolley wheels—A. S. King and A. Wood.
22,251 Train-control systems—W. B. Murray.
22,259 Car trucks—W. S. Adams.
22,302 Braking apparatus for railway and tramway vehicles—A. W. Rendell.
22,320 Block signalling systems for railways—G. Robinson and C. Downham.
22,328 Means for automatically arresting railway trains provided with automatic brakes—W. R. Sykes Interlocking Signal Company, Limited, and J. C. Sykes.
22,354 Manufacture of solid rubber tires—Dunlop Rubber Company, Limited, and W. Wright.
22,385 Collapsible and waterproof apron for the roof seats of omni buses—F. Westcombe and H. Constable.
22,397 Brakes—J. Weller.
22,441 Railway tread fish plates—T. F. K. von Weidenheim, N. von Frakenberg-Luttwitx, and A. O. Kunert.
22,444 Wheel guards for tramcars—L. B. Hewitt and W. Carroll.
22,497 Permanent way of railways—R. Freeman.
22,532 Means for operating car brakes—J. McI. Cater.
22,576 Axle boxes—J. T. McWilliams.
22,596 Rail connections—E. G. Smith.
22,628 Motor vehicles—H. Stevens.
22,646 Method of jointing rails by fish plates—H. F. Kerr.
22,722 Elastic fluid turbines—Warwick Machinery Company (1908), Limited *(General Electric Company)*.
22,730 Power-driven vehicles L. Salvator.
22,898 Water-tube boilers—Babcock and Wilcox, Limited.
22,944 Car trucks—W. S. Adams.
22,955 Splash guards for motor vehicles—H. Markham.
22,986 Railway signalling apparatus—E. C. Irving.
22,993 Mounting the engines and transmission mechanism of motor vehicles—F. H. Royce and Rolls-Royce, Limited.
23,013 Electric signalling systems—C. B. Kersting.
23,018 Chassis for motor vehicles—J. R. Churchill.
23,040 Control of railway traffic—H. A. Thompson.
23,048 Water-tube boilers—H. L. Vinke.
23,099 Steam or elastic-fluid turbines—H. Courteen.
23,117 Automatic brakes for motor vehicles—W. Rybtchinsky.
23,123 Hand brakes for railway vehicles—E. H. Stephens.
23,131 Portable railroad tracks—E. H. Bennett.
23,155 Apparatus for holding and distributing railway or tramway tickets—W. Mottershead.
23,166 Railway carriage—A. Cosstick.
23,210 Railway crossings—Edgar Allen and Company, Limited, and R. S. Brian.
23,231 Track switches for electric transporters, trolleys, etc.—R. D. Hulley and E. A. Claremont.
23,244 Suspension of tramway trucks—E. Peckham and S. Thomas.
23,258 Hauling wheeled vehicles by tractors or locomotives—M. Leytens.

SPECIFICATIONS PUBLISHED.

1913.

19,919 Electric transformers—Coates, Mirrey, and A. Reyrolle and Company.
23,081 Suspension of vehicle bodies on bogies—Thomas.
23,585 Mounting of wheels of self-propelled vehicles—Douglas.
23,898 Railway signalling apparatus and apparatus for stopping trains independently of drivers—Lindon.
19,603 Electric insulation of rail joints—Wills and Sykes.
21,543 Apparatus for actuating and locking points or switches on railways—O'Donnell.
22,668 Motor vehicles—Hazlehurst.
23,362 Side-guards for vehicles—Spong.
23,502 Visual railway signalling apparatus—Parsons.
23,879 Construction of wheels—Challiner.
23,902 Bodywork for motor vehicles—Eastwood.

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WM. STRAIN & SONS, LTD.,
BELFAST, IRELAND,

Contractors to Indian and Colonial Governments.

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CONDENSING PLANT

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"We have tried several makes of Oilskins, but none have been equal to the 'Ailsa' make."

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24,184	Wheels for motor vehicles—Smith.
25,573	Steering gear for mechanically-propelled vehicles—Marles.
27,176	Speed-control apparatus for motor vehicles—Evans.
27,295	Railway signalling apparatus—Barlow.
18,874	Frictional driving gear applicable to wheels for locomotives—Huss.
22,286	Internal combustion engines for use on locomotives—Moore.
24,444	Train signalling systems—Starie.
24,535	Motor vehicles—Wingfield.
24,658	Railway signalling—Downes.
29,457	Prevention of the clogging of sanding pipes on electrically or mechanically-propelled vehicles—Bourn.
16,193	Apparatus for controlling the traffic on single-line railways—Tyer and Tyer and Company.
22,266	Control of trains or other rolling stock on railways—Barbour and Suffern.
24,170	Self-propelled vehicles—Webster and Birrell.
24,337	Electric rotary converters with commutating poles—Akt.-Ges. Brown, Boveri et Cie.
24,885	Signalling apparatus on railways—Ripley.
24,892 24,893	Bodies of motor vehicles—Ward and Lookers, Limited.
25,006	Three-position block instrument for railway and tramway purposes—McKenzie and Holland, Limited, and Edmonds.
25,203	Live-axle drives for self-propelled vehicles—McCurd.
25,494	Universal joint for the transmission of power, more particularly applicable to motor vehicles—Barnes.
25,544	Fittings for electrical conduit systems—Broadbent.
27,006	Apparatus for stopping trains independently of drivers—Carini.
	1914.
943	Variable-speed gear, specially applicable for use in driving motor vehicles—Watkins.
2,266	Brake mechanism for railway vehicles—Gresham.
16,319	Control systems for electric motors—Hall and Riley.
1,143	Supports for electrical conductors—Callender's Cable and Construction Company, and Kay.
3,769	Wheels for motor vehicles—Fodens, Limited, and Foden.
10,363	Springs for rolling stock, motor vehicles, etc.—Russell.
54	Brakes—Swash.
5,234	Dynamo-electric machines—British Thomson-Houston Company, and Hutt.
5,282	Stopping of trains independently of drivers—Philbey.
11,646	Railway track points and switches—Comeau.
12,806	Metal railway sleepers and means for securing rails thereto—Faubel and Roach.
3,552	Electric train or tram control systems—Beard and Shand.
7,884	Electrical insulation for rail or track circuits for railways or tramways—Wills and Sykes.
8,550	Water-tube boilers—Babcock and Wilcox, Limited.
9,267	Step for railway carriages, tramcars and omnibuses—Kunzelman.
9,732	Car trucks—Head.
12,021	Metal railway sleepers—Andrews.
16,792	Rail joints—Borjeson.
18,745	Hand-operated car brakes—Horne and Crane.

Colonial and Foreign Tramways Traffic Returns.

NAME OF COMPANY.	1913. WEEKS ENDED.					1914. WEEKS ENDED.					AGGREGATE.		
	Nov. 1.	Nov. 8	Nov. 15.	Nov. 22.	Nov. 29.	Oct. 31.	Nov. 7.	Nov. 14.	Nov. 21.	Nov. 28.	Wks.	1914.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Anglo-Argentine	54.630	59.167	59.095	51.517	58.239	49.043	52.400	52.884	52.459	50.763	47	2,531.502	– 73,547
Auckland ... ... (28 days)	20.204	...	...	10.497	...	19.777	...	...	19.391	...	20½	104,518	+ 12,264
Calcutta ... ... Rs.	57,802	65,104	69,814	67,754	66,424	56,175	63,686	60,079	60,822	57,364	47	31,40,683	+ 41,669
Madras ... ... Rs.	...	...	...	(2 weeks)	25,530	...	...	...	(2 weeks)	24,558	47	610,734	+ 24,421

Companies Issuing Monthly Statements.

	1913						1914.						Wks.	AGGREGATE.	
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	July.	Aug.	Sept.	Oct.	Nov.	Dec.		1914.	+ or –.
	£	£	£	£	£		£	£	£	£	£			£	£
Brazilian Street Mlrs.	...	...	...	...	...	...	...	...	...	...	...	...	—	—	—
BrazilianTraction Mlrs	...	...	6,028,078	6,098,850	...	...	...	...	6,096,940	6,241,170	...	...	43	61,411,258	+1,488,593
Brisbane	26,205	29,970	...	27,250	...	...	29,680	33,172	...	28,763	...	...	43	288,621	+ 28,603
British Columbia $	755,943	770,628	734,283	...	...	...	690,023	674,812	650,516	...	...	...	13	2,015,351	– 245,503
Buenos Aires Pt. & C.	...	...	..	...	...	...	...	...	...	...	...	...	—	—	—
Buenos Ayres Lacroze	45,221	...	...	...	...	...	43,327	...	...	...	...	...	4	43,327	– 1,894
Cape Town	...	...	...	12,223	...	...	...	...	...	12,682	...	...	17	49,456	+ 2,953
Carthagena & Herrerias	3,794	2,192	1,344	1,582	1,922	...	1,567	2,758	2,175	1,543	1,379	...	47	24,067	– 4,098
Cordoba	13,629	13,691	13,343	13,278	...	...	14,256	13,371	12,384	12,919	...	...	30	94,886	+ 883
East India	1,892	2,005	2,028	1,878	1,922	...	1,966	2,112	1,980	2,007	2,029	...	17	8,128	+ 295
Kalgoorlie	2,796	3,357	3,068	...	...	...	2,552	3,042	2,864	...	...	...	38	23,980	– 2,467
La Plata	4,770	...	4,528	4,920	5,409	...	4,359	...	4,190	4,540	4,540	...	47	50,933	– 4,907
Lima	34,426	33,939	34,177	...	...	...	34,600	29,800	28,786	...	...	...	43	300,472	– 210
Manila ... ... $	...	...	138,000	148,000	...	...	...	...	116,300	125,750	...	...	43	1,341,070	– 48,025
Melbourne	...	...	61,969	...	...	...	...	...	58,664	...	...	...	39	556,386	+ 25,393
Mexico ... ... $	...	635,445	604,744	616,007	...	...	...	687,593	667,421	558,990	...	...	43	6,072,755	+ 340,417
Montevideo	29,189	28,829	27,870	29,225	...	...	26,417	26,075	25,227	26,500	...	...	52	361,465	– 12,061
Port Elizabeth ..	...	...	...	3,553	...	...	...	...	...	3,372	...	...	17	12,522	– 538
Puebla ... ... $	56,700	52,900	51,100	...	...	...	51,000	50,500	52,200	...	...	...	39	534,500	+ 18,800
Rangoon	...	...	5,054	5,963	...	...	...	...	4,119	4,600	...	...	43	50,657	– 942
Toronto ... ... $	811,966	850,222	865,796	...	...	...	866,221	850,639	879,321	...	...	...	39	7,622,107	+ 438,637
Winnipeg ... $	336,821	340,507	331,732	...	...	...	346,630	322,762	310,996	...	...	...	39	3,071,940	+ 90,506

(Continued on page 422

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TRAFFIC RETURNS—*continued.*

Tramways and Omnibus Undertakings in the United Kingdom.

NAME OF COMPANY OR CORPORATION.	1913. WEEKS ENDED.					1914. WEEKS ENDED.					AGGREGATE.		
	Nov. 1.	Nov. 8.	Nov. 15.	Nov. 22.	Nov. 29.	Oct. 31.	Nov. 7.	Nov. 14.	Nov. 21.	Nov. 28.	Wks.	1914.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Aberdeen Corporation	1,434	1,513	1,618	1,472	1,424	1,474	1,601	1,728	1,471	1,465	26	43,700	+ 730
Accrington Corporation	580	576	563	562	569	450	431	477	435	416	34	18,717	- 1,132
Ayr Corporation	254	238	243	239	239	226	224	230	206	220	28	11,266	- 970
Bath Electric	898	799	825	775	736	809	891	845	741	680	47	45,510	+ 18
Birkenhead Corporation	1,431	1,228	1,232	1,225	1,416	1,161	1,216	1,199	1,115	1,181	34½	43,932	- 1,619
Birmingham Corporation	12,472	12,313	12,649	12,296	12,291	11,894	12,408	12,009	11,591	11,734	35	422,091	+ 10,871
Blackburn Corporation	1,319	1,249	1,229	1,169	1,284	1,029	1,089	1,022	1,017	950	35	45,853	+ 686
Blackpool Corporation	700	784	535	504	504	618	766	558	523	513	35	64,059	- 9,908
Bolton Corporation	2,789	2,585	2,738	2,603	2,786	2,465	2,507	2,434	2,328	2,387	35	95,571	- 804
Bournemouth Corporation	1,794	1,720	1,644	1,658	1,621	1,639	1,663	1,693	1,577	1,654	35	73,068	- 3,968
Bradford Corporation	6,067	5,581	5,569	5,589	5,594	6,017	5,828	5,936	5,430	5,615	35	217,697	+ 8,977
Brighton Corporation	943	877	903	893	854	919	936	846	766	776	34½	40,142	- 354
Bristol	7,602	7,720	7,537	7,275	6,915	8,139	8,263	7,926	7,645	7,679	47½	405,523	+ 23,216
Burnley Corporation	1,739	1,593	1,654	1,579	1,631	1,225	1,394	1,305	1,255	1,236	35	54,184	- 5,977
Burton-on-Trent Corporation	279	267	297	269	275	278	283	287	245	267	35	10,485	+ 237
Bury Corporation	1,351	1,297	1,276	1,255	1,339	1,176	1,199	1,151	1,100	1,104	34½	47,081	+ 761
Cardiff Corporation	2,642	2,672	2,642	2,683	2,619	2,453	2,522	2,441	2,256	2,342	34	96,453	+ 18
Chatham and District	895	921	873	848	812	1,007	1,036	1,033	908	886	47	45,451	+ 1,528
Chesterfield Corporation	255	260	256	259	251	241	247	244	235	231	34	9,312	+ 313
Colne Corporation	272	286	256	242	254	196	208	204	173	193	—	—	—
Cork Electric	499	488	483	456	446	465	459	476	444	424	47	23,614	- 113
Croydon Corporation	1,583	1,625	1,570	1,546	1,508	1,536	1,653	1,584	1,469	1,445	34	59,828	+ 1,996
Darlington Corporation	249	243	246	246	242	250	241	237	234	238	35	9,252	+ 483
Derby Corporation	921	939	1,050	929	901	934	943	974	904	894	34½	35,476	+ 733
Dover Corporation	224	211	207	197	180	247	239	220	201	197	35	9,054	- 39
Dublin and Lucan	117	117	106	110	112	119	114	120	112	105	21½	3,186	- 29
Dublin United	4,727	4,901	4,785	4,722	4,747	5,408	5,892	5,640	5,368	5,365	47	277,488	+ 17,940
Dundee City	1,261	1,323	1,258	1,261	1,844	1,221	1,240	1,264	1,178	1,186	27½	36,077	- 658
East Ham Corporation	943	975	1,016	991	951	1,196	1,202	1,201	1,144	1,167	34½	40,962	+ 5,675
Exeter Corporation	332	319	311	292	286	315	323	318	283	276	35	12,524	+ 195
Gearless Motor 'Buses	...	...	...	...	...	...	...	...	...	...	—	—	—
Glasgow Corporation	21,097	20,691	20,648	20,361	20,696	20,006	20,495	20,227	18,891	19,572	25	523,932	+ 419
Glossop (Urban Elec. Supply Co.)	128	115	123	118	122	100	100	99	89	91	48	5,790	- 426
Halifax Corporation	2,026	2,193	1,879	1,865	1,940	2,008	1,994	2,104	1,841	1,854	34	76,586	+ 2,786
Hastings and District	899	865	818	766	781	837	804	851	722	661	48	48,056	- 2,848
Huddersfield Corporation	2,099	2,022	2,071	2,007	2,051	2,287	2,395	2,353	2,137	2,199	35	102,353	+ 8,068
Hull Corporation	3,182	3,121	3,243	3,163	3,170	2,934	3,014	2,984	2,897	2,932	35	108,599	- 1,386
Ilford U.D. Council	432	444	447	429	433	562	600	578	556	548	35	19,771	+ 3,970
Ilkeston Corporation	127	126	133	125	127	118	121	116	107	114	35	4,601	- 221
Ipswich Corporation	415	398	416	393	365	406	407	387	346	347	35	16,330	- 278
Isle of Thanet	390	362	342	332	323	361	357	305	258	253	8	3,039	- 486
Kilmarnock Corporation	170	160	165	162	166	152	152	151	136	142	28	4,629	- 413
Lanarkshire	1,924	1,851	1,786	1,707	1,828	1,828	1,709	1,741	1,622	1,598	47	88,131	+ 7,013
Lancashire United	1,566	1,610	1,551	1,557	1,551	1,473	1,511	1,487	1,451	1,358	47	76,884	+ 3,431
Leeds City	8,209	8,009	7,969	7,956	8,093	7,838	8,064	8,016	7,436	7,825	35	288,931	+ 21
Leicester Corporation	2,777	2,766	2,865	2,775	2,795	2,689	2,811	2,736	2,728	2,664	48	136,121	+ 2,236
Leith Corporation	686	678	659	637	663	689	715	677	613	624	28	20,608	+ 198
Leyton U. D. Council	1,229	1,299	1,282	1,301	1,283	1,321	1,399	1,408	1,331	1,296	33	46,995	+ 2,054
Liverpool Corporation	13,026	12,969	12,967	12,719	12,793	12,408	12,937	12,655	11,704	12,113	47½	623,055	+ 8,255
Llandudno and Colwyn Bay	178	162	151	156	154	160	163	159	148	143	52	15,616	- 2,057
London County Council	41,639	43,202	43,523	42,565	41,687	45,883	46,486	47,046	45,130	43,939	34	1,513,507	+131,334
London General Omnibus	...	...	...	...	...	...	...	...	...	...	—	—	—
London United	...	...	...	...	...	...	...	...	...	...	—	—	—
Lowestoft Corporation	203	197	199	194	171	187	198	182	161	161	8	1,530	- 163
Maidstone Corporation	187	194	184	196	177	179	195	181	159	148	35	7,501	+ 152
Manchester Corporation	17,752	17,120	17,416	17,344	17,616	16,417	16,938	16,673	15,504	16,399	35	603,819	- 10,133
Metro. Electric Tramways	...	...	...	...	...	...	...	...	...	...	—	—	—
National Steam Car	4,932	3,570	3,589	3,688	4,896	5,496	4,055	3,728	3,229	4,073	4	15,085	+ 658
Nelson Corporation	201	179	215	179	217	162	141	148	128	162	34½	6,608	- 843
Newcastle-on-Tyne Corporation	4,999	5,012	5,015	4,994	5,054	5,683	5,770	5,636	5,364	5,586	35	190,237	+ 19,254
Newport (Mon.) Corporation	796	784	776	766	769	755	752	734	685	695	35	28,752	+ 1,691
New St. Helens and District	749	773	747	741	738	889	830	859	806	754	21	20,349	+ 1,848
Northampton Corporation	551	545	541	540	514	603	608	575	592	572	34½	20,726	+ 323
Nottingham Corporation	3,296	3,326	3,334	3,318	3,235	3,191	3,297	3,279	3,124	3,052	34½	117,839	+ 1,125
Oldham Corporation	2,299	2,174	2,157	2,161	2,171	1,908	1,954	1,891	1,836	1,891	36	79,022	- 867
Portsmouth Corporation	1,982	2,039	1,996	1,893	1,872	1,987	2,223	2,086	1,857	1,792	35	85,836	—
Preston Corporation	861	882	838	856	823	837	859	886	809	793	35	32,074	+ 880
Provincial	1,706	1,698	1,689	1,604	1,672	1,884	2,020	1,920	1,792	1,748	8½	16,545	+ 1,871
Reading Corporation	683	754	742	643	645	634	675	646	610	585	34	24,581	+ 314
Rhondda Tramways	1,207	1,231	1,219	1,206	1,224	1,138	1,145	1,149	1,097	1,035	47	57,947	+ 903
Rochdale Corporation	1,609	1,549	1,545	1,486	1,549	1,403	1,459	1,456	1,350	1,398	35	57,072	+ 220
Rotherham Corporation	1,226	980	1,017	1,011	1,005	1,084	950	924	918	950	35	36,420	+ 928
Salford Corporation	5,240	5,025	5,084	5,614	5,154	4,727	4,755	4,527	4,350	4,982	34	175,868	- 8,032
Sheffield Corporation	7,757	7,431	7,681	7,600	7,640	7,615	7,821	7,525	7,281	7,511	35½	274,766	+ 6,599
Southampton Corporation	1,214	1,291	1,241	1,206	1,198	1,146	1,246	1,185	1,098	1,047	34	46,322	- 324
Southend-on-Sea Corporation	725	756	702	700	671	724	712	697	615	579	35	37,430	+ 2,180
South Metro. Tramways	...	...	...	...	...	...	...	...	...	...	—	—	—
South Shields Corporation	661	677	661	676	657	695	748	671	633	645	34½	26,865	+ 1,595
Sunderland Corporation	1,406	1,294	1,317	1,370	1,305	1,345	1,342	1,270	1,317	1,342	35	52,006	+ 892
Swindon Corporation	156	162	158	153	151	178	184	172	158	148	34	6,201	+ 413
Torquay Tramways	447	432	408	385	399	414	394	416	331	322	47	26,444	- 3,720
Tramways (M.E.T.) Omnibus Co.	...	...	...	...	...	...	...	...	...	...	—	—	—
Tyneside Tramways and Tramroads	492	487	458	466	462	630	549	554	489	486	22	13,532	+ 1,997
Wallasey Corporation	1,125	1,095	1,101	1,079	1,084	1,041	1,103	1,067	974	994	34½	44,733	+ 1,154
Walsall Corporation	643	630	656	633	621	626	673	643	614	625	48	30,030	+ 147
Walthamstow U.D. Council	690	713	708	696	674	707	744	736	687	688	35	28,739	+ 2,526
Warrington Corporation	442	443	451	456	457	415	454	432	411	394	34	14,975	- 447
West Ham Corporation	2,648	2,758	2,738	2,668	2,567	2,733	2,803	2,834	2,690	2,620	34	67,634	+ 3,540
Wigan Corporation	1,457	1,487	1,550	1,496	1,499	1,456	1,377	1,362	1,310	1,310	34	50,181	- 1,412
Wolverhampton Corporation	1,061	1,061	1,029	1,041	1,059	1,020	1,012	1,011	920	1,016	36	37,349	- 1,180
Yorkshire (West Riding)	1,458	1,556	1,442	1,393	1,400	1,378	1,496	1,489	1,278	1,375	48	69,594	- 27

ELECTRIC RAILWAY TRAFFIC RETURNS.

Owing to the European war, the Government have taken over the railways of Great Britain as from August 4, and the issue of traffic returns has been suspended. Consequently the traffic returns of the electric railways which usually appear on this page cannot be given.

TRAMWAY DIRECTORIES.

A useful feature of this issue is the directory of electric railways and electric tramways which will be found among the advertising pages. This directory contains the names of the chief officals and the principal particulars relating to each undertaking.

The directory is revised as occasion requires, and is the most up-to-date and comprehensive list published.

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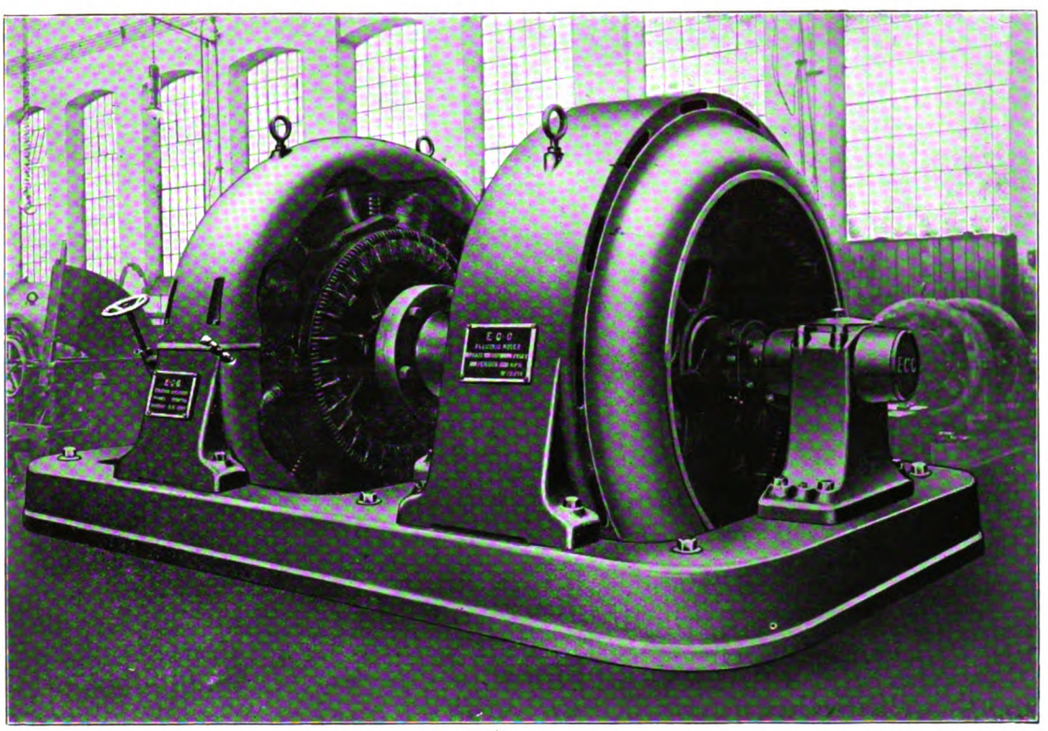

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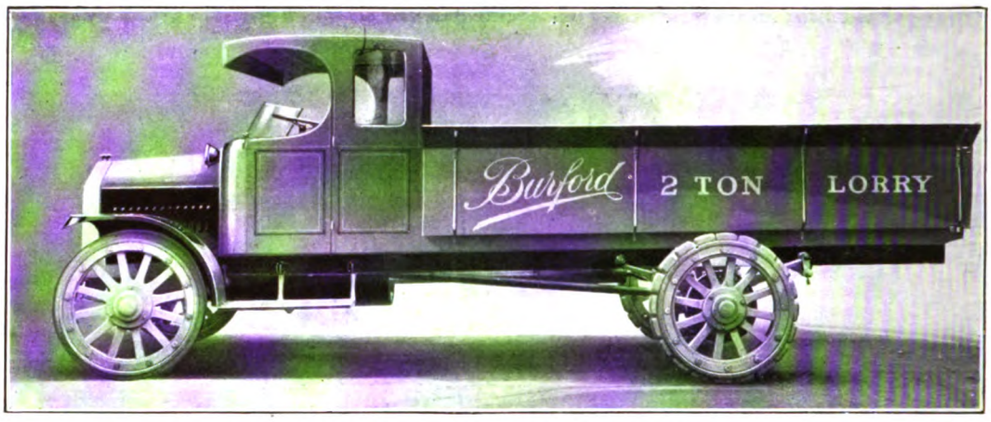

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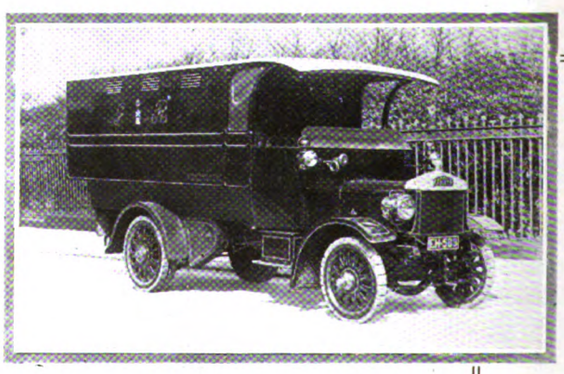

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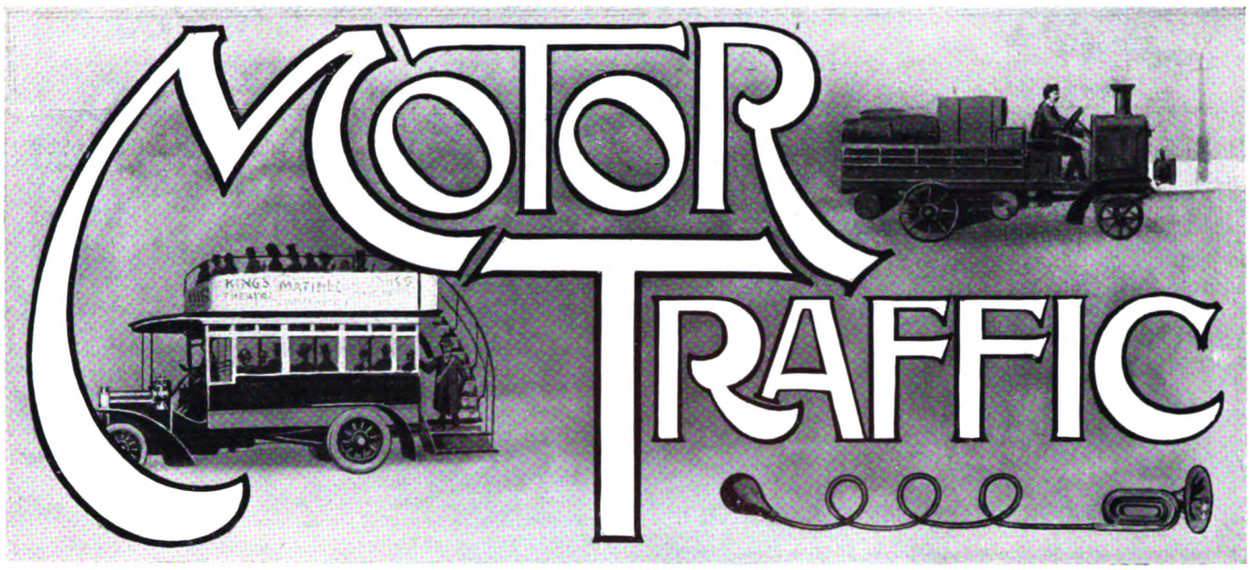

From reports which are already coming to hand it appears that, although the majority are doing remarkably well under the trying conditions, a number of the vehicles which were impressed in the early days of the war are giving anything but satisfactory service. Without the knowledge of the full facts it is quite impossible to point definitely to the cause of these failures, and it would be manifestly unfair to attribute blame to the manufacturers, unless the actual condition of each machine at the time of impressment were known as well as the nature of the service it has been called upon to give. The manner of its handling would, of course, also have an influence upon the life of the chassis. The fact that indifferent service has been given by certain machines reminds us of the stories current during the month of August as to the somewhat peculiar ideas of value shown by some of the inspecting officers, who were appointed post haste for the important duty of selecting machines suitable for the War Office requirements. One can readily understand that for patriotic reasons alone a number of well qualified men were anxious to give their services in this direction, but on the other hand there were those, judging by the reports current at the time, whose knowledge and experience can hardly be said to have fitted them for the onerous duties of the post. Naturally the invoice price of a machine should be taken as some guide when determining the price to be paid for an impressed vehicle, but when practically the whole of the negotiation consists of an argument based upon the price originally paid for the machine, and the time that has elapsed since the purchase was made, without regard to the work done, one must be forgiven for suspecting that bad selection has something to do with the failures that are now coming to light.

It is a well known fact that, prior to the war, many machines of reliable design and manufacture had been habitually working practically night and day, and this frequently with an over load. Owing, however, to a perfect knowledge of the behaviour of each component part, the men responsible for the upkeep of these machines were able to keep them on the road, paying constant attention to the peculiar requirements of each individual machine. Now, it is obvious that if such vehicles were impressed and placed in the hands of the average driver without any special knowledge of their condition, failure must come sooner or later. In view of the urgent necessity for a very large number of vehicles for immediate service, one can understand that even the expert engineer would be inclined to take vehicles of well-known makers that were very much the worse for wear, providing that the regular driver were available, but for such machines to be sent away in large numbers in strange hands, where there were practically no facilities for overhaul, was simply courting trouble, and in our opinion is the main cause of the failures of which reports are being circulated.

The decision given recently in the Court of Appeal in the case brought against Messrs. Thomas Tilling, Limited, for damages in respect to an accident caused by the alleged negligence of their servants, is of considerable importance to the authorities responsible for the running of all public service vehicles. In this case the plaintiff was standing upon the footpath of the road along which an omnibus owned by Messrs. Tilling was proceeding. The vehicle was empty at the time, and the conductor was not in his usual place, but was seated with the driver and actually driving the omnibus. Upon reaching the spot where the plaintiff was standing the vehicle mounted the pavement, and after colliding with a lamp post knocked down several persons (including the plaintiff), one of whom was killed. The trial of the action was heard before Mr. Justice Atkin, and he held that inasmuch as there was no evidence to show that the conductor was authorised by the defendants to drive the vehicle, there was no case to go to the jury. From this decision an appeal was immediately lodged, with the result that it has now been decided that the defendants are liable. It is obvious that if the decision given by Mr. Justice Atkin had been allowed to stand, very serious complications would have followed in the working of public vehicles. While it would then have been possible for proprietors to protect themselves in law against the liability of accidents of this kind by merely turning a blind eye to the conductor who is anxious to learn to drive, the consequence would mean that the two men, who between them are responsible for the safe working of the vehicle, would have their respective duties definitely defined by law with the public alone to suffer should an accident occur, as in this case, as a direct result of the conductor's breach of duty. In view of the growing importance of public motor vehicles in the daily life of our large communities, continuity of service is essential. It therefore appears to us to be desirable that all conductors should be encouraged to qualify as drivers in order that, should the regular driver be incapacitated either by accident or illness, his place

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MOTOR TRAFFIC.

could be, more or less efficiently, taken by the conductor until relief could be provided. Apart from the instruction which could be given in the garage, actual driving practice would be essential, and in this case the conductor would have to be authorised by the proprietors to drive, and therefore, under Mr. Justice Atkins' decision, be liable for accidents. Clearly the original judgment was bad, and in the interest of all proprietors concerned, whether corporations or companies, must be prepared to accept such responsibility, and at the same time retain their freedom to arrange the working of their vehicles as the conditions of the service demand.

NEW WORKS OF LEYLAND MOTORS, LIMITED.

Messrs. Leyland have acquired new premises at Chorley for the extension of their steam vehicle department. They have arranged to purchase the works which were recently built for Messrs. Baxendale Brothers at Chorley, and owing to the present state of the cotton industry are not now required. The building is 250 ft. long by 150 ft. wide, and is equipped with a complete steam power plant. The removal of the repair department of the steam vehicle section from the company's works at Leyland will enable them to considerably accelerate the output of new work. It is anticipated that they will take immediate possession of the new premises.

DENNIS BROTHERS (1913), LIMITED.

The report of the directors of Dennis Brothers (1913), Limited, makes very satisfactory reading, as the net profit on the year's trading is no less than £61,484. Speaking in support of the chairman's motion for the adoption of the report, Mr. Raymond Dennis spoke in the highest terms of the loyalty and energy of the whole of the company's staff. He further gave it as his opinion that the experience which British manufacturers generally are obtaining as to the performance of their vehicles under the worst possible road conditions would be of the greatest possible value to the industry, as they would learn just what to do and just what to avoid in the design and construction of cars destined for use under similar conditions in all parts of the world. We are told, he said, from time to time, that we manufacturers concentrate too much on the construction of vehicles designed to work on good roads. In future there can be no question that our experience in the construction of models suitable for all kinds of service will be unequalled.

THORNYCROFT COMMERCIAL VEHICLES.

Messrs. John I. Thornycroft and Company, Limited, have just issued a handsome new commercial motor vehicle catalogue dealing with the various classes of vehicles which they produce. The models range from those designed to carry useful loads of 15 cwt. up to those which will take over 5 tons. The present war has, of course, had a marked effect on the motor vehicle industry, owing to the excessive demand, and it is accordingly not surprising to find a note to the catalogue mentioning an advance in price of vehicles of 10 per cent. owing to the increase in prices of raw materials. There is also a caution as to possible delay in delivery. High-tensile steel enters prominently into the construction of Thornycroft chassis, and though this fact increases first cost it ensures long life and constant service. An interesting fact to be gleaned from the booklet is that on the outbreak of the present war the British War Office instructed the firm to supply their entire output of 40-H.P. type J vehicles for the military transport service, and in addition purchased a number of other types. The reliability and excellence of the vehicles dealt with in the present catalogue are assured by the fact that they are the outcome of more than 15 years' experience in the design and construction of petrol commercial and public service vehicles. One of the most interesting things in the book is a detailed table showing the approximate cost of running Thornycroft vehicles of the various types in the United Kingdom. The firm receive enormous numbers of letters asking for information as to running costs, so it may be hoped that the publication of these carefully-compiled tables will save much correspondence, as well as bring enlightenment to many who do not go so far as to send in queries. The price list tables given are elaborate, and go also into much detail as to dimensions. Altogether, there is a mine of information in this catalogue, copies of which will be sent post free to all interested who apply.

THE WAR AS THE HEAVY MOTOR'S MAGNA CHARTA.

(From an Occasional Correspondent.)

A remarkable situation may be forecasted as likely to arise in connection with the approaching inquiry by a Joint Committee of the Houses of Parliament into the conditions of taxation of heavy motor vehicles. Among the specific objects of the investigation is the important question whether an increased impost should be placed upon them for the direct purpose of road maintenance, as is already imposed by Parliamentary Committees in the cases of internal combustion engines and railless trolley vehicles, except when the former class are run by private owners. If the advocates entrusted with the presentation of the case for public passenger and commercial motor conveyances are animated by a thorough conception of the new claims that may be advanced as the result of the European war, the brief to be put forward will cause the municipal and Parliamentary advocates of further taxation to be hard pressed.

The main feature of the new circumstances is that the motor omnibus, lorry, and van have proved of untold value to our army in the fight for the freedom of Europe and the existence of the British Empire. In past wars, and even at manœuvres, there have been

A London General Omnibus Chassis with Armoured Body.

occasions when the breakdown of the horse-drawn transport service has entailed serious results to the troops. In the sanguinary fighting that accompanied the retirement of the Allies towards Paris, as well as in the forward movement of the past two months, motor transport has proved to be the salvation of the French and British Armies. Deprived of the advantages of their motor columns for the conveyance of troops, food, ammunition, and the wounded, the armies would have been faced by almost, if not quite, insurmountable difficulties. In the case of the French Army operating in their own country the task of organising the motor transport has not been so arduous as in that of our troops. The Quartermaster-General's department has been obliged to find means of transport from one country to the other of the whole of the Army's impedimenta. These means have ranged from motor omnibuses to commercial vehicles and cabs, in addition to petrol and steam tractors. For each of these classes the exigencies of war have brought uses that were not generally contemplated in the schemes for their employment, and for these additional tasks motors alone are of real utility. Notable instances are to be found in the rapid movement of troops for surprise purposes and in the transportation of heavy guns. Our transport service with its marvellous achievements, though not specifically mentioned, was one of the departments whose labours helped to win for the Quartermaster-General the praise that Field-Marshal Sir John French lately bestowed upon his subordinates at the conclusion of the first stage of the operations.

The time has not yet arrived for the publication of any reports that may have been prepared upon the subject, but a diligent study of such communications as newspaper correspondents have been allowed to pen

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MOTOR TRAFFIC.

from their positions at the base and on the lines of communication, as well as from narratives gathered from returned combatants and others, gives ample indication that motor vehicles have rendered services that entitle them to receive from Parliament more consideration than has hitherto been accorded to them. Those services should affect the arguments hitherto advanced in favour of the imposition of additional taxation; but there can be no reasonable objection taken to the recent recommendation of the Parliamentary Committee on Local Taxation in favour of an inquiry into the matter of axle weights, etc. Apart from the greatly increased need of the services of the heavy machines for military purposes, consideration should be given to the fact that their utility to the community in civil life may be said to be on a higher plane than that of cars which simply contribute to the pleasure of their owners. Public passenger and commercial transit confers both a local and a national advantage; and it would be a retrogade movement if the vehicles engaged in all these works were subjected to anything like a revival of the tollgate.

London Omnibuses en Route from Antwerp to the Coast.

Looking at all the claims of the heavy motor, including their newly-proved usefulness in war times, it would be an act of statesmanship for the Government to take over the whole cost of the maintenance of main roads. A considerable step in that direction was taken by the Chancellor of the Exchequer in the Budget for 1914, as a concession to the clamour of local authorities in the matter of roads and for other reasons. This has involved action on the part of the Road Board in securing the classification of roads. With this nucleus of a National Road Department in existence there would be little difficulty in devising a scheme to serve the double purpose of securing uniform progress in road improvement, while allowing for a continuance of the present era of experiment with various materials, and of preserving the freedom of municipal government. From several points of view the moment is opportune for the consideration of this larger aspect of the road question. One of the most important is that, as the outcome of the European war, there will be a shortage of horses in Great Britain and Ireland. Steps are already being taken to secure the adoption of motor vehicles in the place of horses impressed by the military. Thus the roads will be required to carry an increased motor traffic. Doubtless these various aspects of the question, an outline of which has been attempted in these notes, will be accorded due discussion in the proceedings of the Joint Committee of the Houses of Parliament. If recommendations on those lines are tabled by that body the war will have proved to be almost as great an advantage to the heavy motor as the Motor Car Act was to the motor vehicle in general by liberating it from the thraldom of the red flag carried by a man on foot, as in the case of road locomotives.

MOTOR SERVICES IN GLOUCESTER DISTRICT.

In connection with some statements recently made at a meeting of Gloucester Town Council regarding motor omnibuses run there by the Bristol Tramway and Carriage Company, Mr. Samuel White, managing director of the company, has published a letter which he sent to the town clerk of Gloucester on October 9. In this he said the company desired to give accommodation on the routes lying between Gloucester and Tewkesbury, and Gloucester and Ledbury, those being the principal places most difficult of access. The public convenience should be placed before any other consideration, and the company thought they were already yielding up much in fixing the fares for the portion of the trip within the city at double the tramway fares, so as to avoid any competition with the tramways. Mr. White submitted that the company ought to be encouraged in every possible way by the Corporation to develop all these outlying districts and sweep the population into Gloucester to do their trading, and likewise to give the Gloucester people the great advantage of being able reach out to Tewkesbury, Ledbury, etc., by a reliable motor omnibus service from their own doors. The company desired to work in harmony with the Tramways Committee. Mr. White also pointed out that the company had up to the present invested in Gloucester £14,000, of which no less than £5,000 was in fixed property on which rates had to be paid. Surely, therefore, it was undesirable that the Council should take up such an attitude as to refuse licences.

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MOTOR TRAFFIC.

BENZOL, ALCOHOL, AND MIXTURES OF THESE LIQUIDS WITH PETROL, AS FUELS FOR INTERNAL COMBUSTION ENGINES.*

By Professor W. Watson, D.Sc., F.R.S.,
with the assistance of
Messrs. C. W. Frost, W. C. Lloyd, F. W. Richards, W. J. Stern, H. Shaw, and J. Wilson.

1. In a number of papers previously communicated to the Institution the results obtained in the course of various tests carried out at the Royal College of Science have been described, the fuel used in every case being petrol (Pratt No. 1). It seemed of interest to conduct a series of tests on the same general lines and with the same apparatus on other fuels, and in the present paper are given the results for benzol and alcohol. A certain number of tests with petrol are also given, since these tests were carried out at the same time as those with the other fuels, and are therefore directly comparable with them.

With fuels such as benzol and alcohol, as also with the heavier brands of petrol, the question of carburation, particularly when starting, becomes one of considerable importance. This is more particularly the case in cold weather, and when a self-starter is relied upon. Hence a discussion of the effects of the physical properties of the fuels on the production of an explosive charge in the engine cylinder is included, and a number of measurements are given bearing on this point.

The engine employed is a single-cylinder Knight sleeve-valve engine, kindly lent to the laboratory by the Daimler Motor Company, of Coventry, and the authors desire to express their thanks to that company for the assistance thus rendered. It is only by such help that it is possible to carry out investigations of this character, as the funds at the disposal of the laboratory are quite inadequate to buy engines and the like.

The engine has a bore of 101·6 mm., and a stroke of 130 mm., and is direct coupled to a dynamo, the field magnets of which are supported in such a manner as to permit of the measurement of the torque. This dynamometer, as well as the arrangements employed to measure the air and fuel supplies, sample the exhaust gases, and obtain the indicated horse-power, have been described in previous communications.†

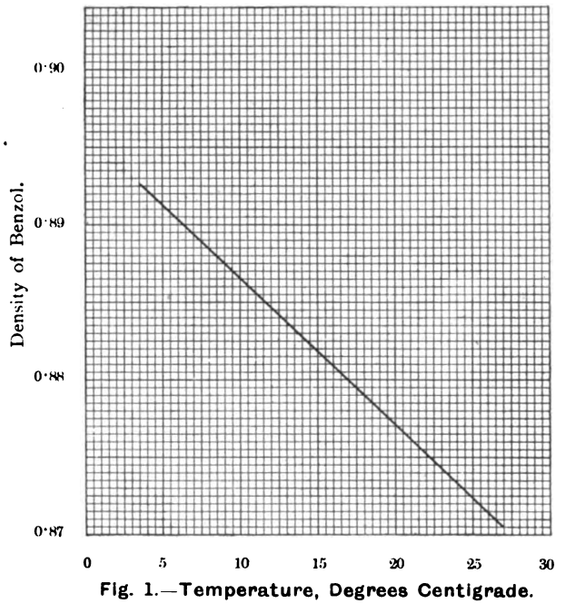

Fig. 1.—Temperature, Degrees Centigrade.

2. *Benzol.*—The benzol employed for the tests was coke-oven benzol, and was presented to the laboratory for these tests by Messrs. Pease and Partners, Limited, of Eldon Colliery, Bishop Auckland, to whom also the authors' best thanks are due.

The density of this benzol at different temperatures is given in Fig. 1. Since pure benzene becomes solid at a temperature of about 5 deg. C., it appeared of considerable interest to see whether the admixture of toluene, xylene, etc., in benzol was sufficient to lower the freezing point to such an extent that the fluidity of the fuel should not be seriously impaired at temperatures likely to be reached in this country. It was found that crystals commenced to form at a temperature of — 4 deg. C. The whole liquid formed a pasty mass at — 8 deg. C., and was practically solid at — 12 deg. C.

Similar results were obtained with two other samples of benzol which had been purchased at two different garages. The crystals which form at — 4 deg. C. at once sink in the liquid, so that not only is the carburettor jet likely to get choked if this temperature is reached, but the accumulation of crystals in the pipe leading from the tank is also certain to impede the flow. Thus mere heating of the carburettor is not sufficient if temperatures much below 0 deg. C. are reached in any part of the fuel supply system. Although the temperature may not be low enough to cause the separation of crystals, yet the viscosity of the liquid might change so greatly in the neighbourhood of the temperature at which solidification commences as to seriously influence the supply of fuel through the carburettor jet.

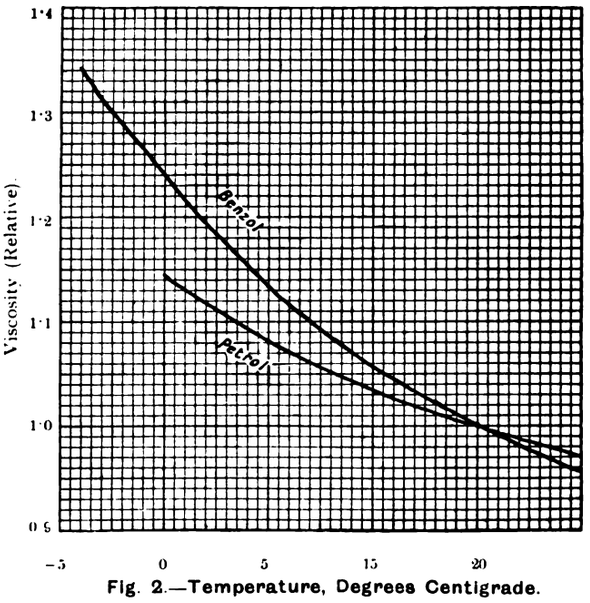

Fig. 2.—Temperature, Degrees Centigrade.

To examine this effect the viscosity of the benzol was measured at different temperatures, that of a sample of petrol (Pratt No. 1) being determined at the same time. The results are given in Fig. 2. These curves give the *variation* of the viscosity with temperature, the value of the viscosity for each liquid being taken as unity at a temperature of 15 deg. C. It will be observed that as the temperature falls the viscosity of the benzol increases at a greater rate than that of petrol. The inference is that it is important to heat the *jet* of the carburettor or any constriction in the fuel supply passage which is employed to regulate the flow of the benzol.

This was very clearly shown in some experiments conducted in the laboratory by Mr. E. J. Wheldon on a model carburettor to which a variable suction, arranged to imitate that of an engine, could be applied. He found that when using benzol his results were very irregular unless the air supply was heated to a much greater extent than was required when using petrol.

If it is required to obtain the actual viscosity of benzol or petrol at different temperatures, the numbers given in Fig. 2 can be employed, multiplied by the value at 15 deg. C., which for benzol is 0·0064, and for petrol 0·0048, the units being dyne-seconds per square centimetre.

A mixture containing one part by volume of petrol to three of benzol starts depositing crystals at − 14 deg. C., while a mixture containing equal volumes of benzol and petrol gives no separation even at − 21 deg. C. Thus admixture of petrol with benzol has a very marked influence on the freezing point, and it would appear advantageous always to mix about 30 per cent. of petrol with the benzol. As will be seen later, this admixture of petrol is of advantage in assisting starting in cold weather.

The question as to the vapour tension is postponed, as it is more convenient to discuss the effects of this for the three fuels together.

The lower calorific value of the benzol, as measured with the apparatus described on page 430 of Vol. III. of the Proceedings of the Institution, is 16,770 B.Th.U. per pound.

* A paper read before the Institution of Automobile Engineers on December 9, 1914.
† See Proc. I. A. E., Vol. VII. p. 35.

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In Fig. 3 are given the results of the measurements of mean effective pressure for different strengths of mixture, all taken at a speed of about 900 revolutions per minute. For comparison the corresponding quantities for petrol are shown on the same figure.

In Fig. 4 are given the thermal efficiencies both for benzol and petrol.

The composition of the exhaust gases is given in Fig. 5, by means of which the strength of mixture in any test using benzol can be deduced from an analysis of the exhaust gases.

When using strong mixtures of benzol, *i.e.*, those containing less than 12 parts of air to one of benzol by weight, it was found that the

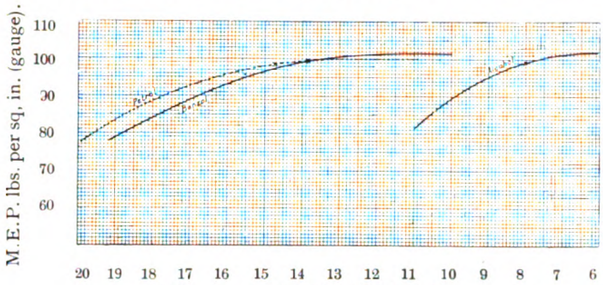

Fig. 3.—Air/Fuel. By Weight.

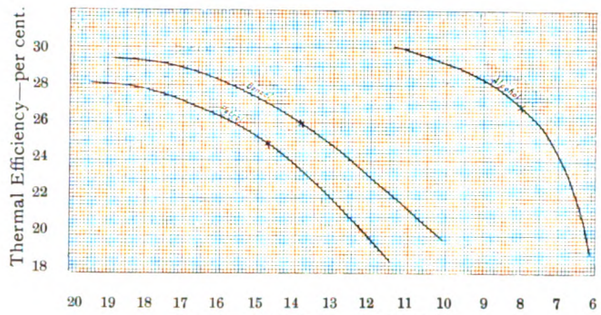

Fig. 4.—Air/Fuel. By Weight.

carbon deposit in the engine was excessive. In particular, the exhaust port in the inner sleeve became rapidly choked, and as a result the volumetric efficiency of the engine, and hence also the horse-power developed, fell very greatly. Thus, with an air-benzol ratio of 10·5 after four gallons of benzol had been consumed, the brake horse-power at 1,000 revolutions per minute fell 18 per cent., due to throttling at the exhaust port. As long, however, as the mixture strength is so adjusted that no carbon monoxide, or at most only a very small quantity, is present in the exhaust, the carbon deposit is no worse than with petrol. This has also been found to be the case with a car engine (80 mm. by 120 mm.) which, on dismantling after being run 2,000 miles on benzol, only had a very thin coating of carbon. No signs of corrosion have been obtained when using benzol.

Although the mean effective pressure obtained with benzol does not materially exceed that obtained with petrol, as is well known, a car engine appears in many cases to develop markedly more power with benzol than with petrol, particularly on a hill, *i.e.*, at low engine speeds. The fact of the matter appears to be that at low engine speeds and with open throttle, an engine will knock violently with petrol, so that it becomes necessary partly to close the throttle and retard the spark, thus reducing the power developed; while with benzol no such knock occurs, and hence the throttle can be kept wide open and the spark properly advanced. On the test bench, however, if the knock is allowed to go on, nearly as great a power can be obtained with petrol as with benzol, at any rate for a short time, and with a single-cylinder engine.

Wherever the actual seat of the knock, the cause undoubtedly is too rapid spread of the flame in the charge, thus causing an almost explosive rise of pressure. This is very clearly visible in the indicator diagrams. When the engine knocks, the rise of pressure is so rapid that violent pressure waves are produced in the pipe connecting the indicator to the cylinder. The increase in the rapidity of the rise in pressure as the engine heats up is illustrated in Fig. 6. The diagrams are obtained by altering the phase of the indicator piston motion, so that during the burning of the charge the horizontal motion of the spot of light is at its maximum. A scale of time is placed below the diagrams, the zero corresponding to the upper dead centre. Fig. 6 (*a*) is taken just before the knock started, while (*b*) was obtained shortly after, when the knock was quite pronounced. The engine was not stopped between the diagrams, but the temperature of the cooling water was allowed to rise. In Fig. 7 a diagram is reproduced which was obtained just as the change from the regular and comparatively slow burning condition was taking place. In the case of both Figs. 6

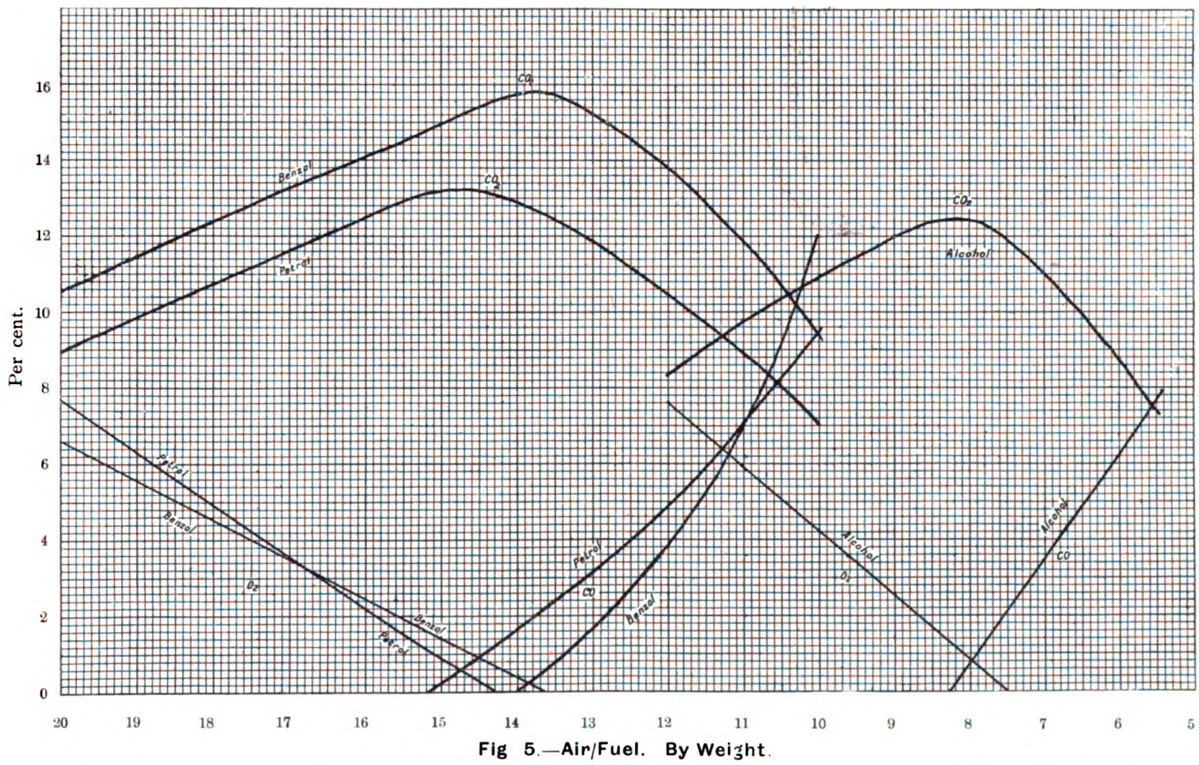

Fig 5.—Air/Fuel. By Weight.

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and 7 the fuel was petrol, the air/petrol ratio being such as to give complete combustion.

As long as the conditions are such that the ordinary comparatively slow mode of combustion occurs, *i.e.*, such as not to give a knock, the rate at which the pressure rises with petrol is slightly greater than with benzol. Direct measurements of the time which elapses between the passage of the spark and the attainment of maximum pressure were made on a low-compression engine having an L-shaped combustion chamber. This engine was used since the rate of flame propagation in it was very much less than in the Knight sleeve-valve engine. In Fig. 8 the pressure rise as a function of the time is given for petrol and benzol, the mixture in each case being nearly that corresponding to complete combustion. The instant at which the spark passed is

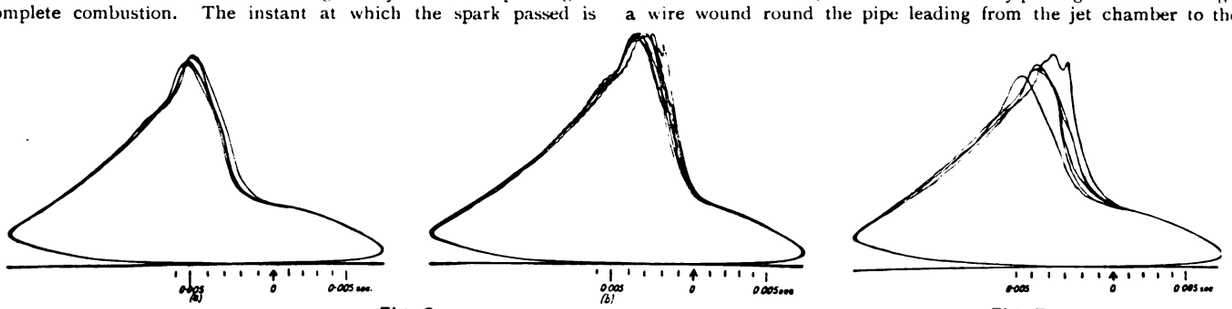

Fig. 6. Fig. 7.

indicated by a cross. The rise in pressure with petrol is more rapid than with benzol, but the difference is not very great. With the sleeve-valve engine the difference is even less marked, as long as no knock occurs. This is what might be expected, since the speed at which the flame spreads is more dependent on the turbulence in the charge than on the nature of this charge.

The absence of knock when using benzol as a fuel appears to be due not to a difference in the speeds of ordinary flame propagation in benzol and petrol, but to the fact that when the temperature of the mixture is raised above a certain critical value the charge fires in an

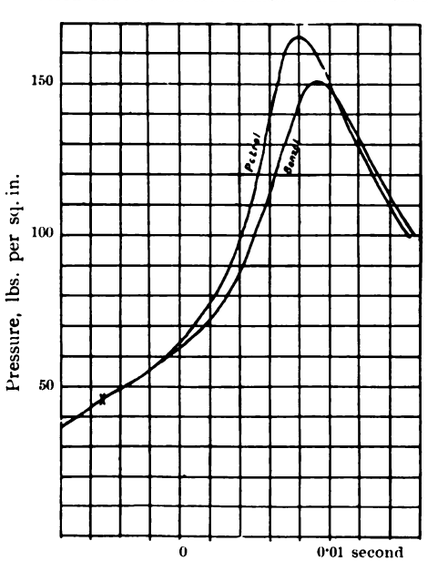

Fig. 8.—Time.

entirely new manner which is much more nearly a detonation than an inflammation, and that this critical temperature is much lower for petrol than for benzol. This is a subject which is being investigated in greater detail at present, and it is hoped to elucidate the matter further, not only for benzol and petrol but also for other fuels. It may be remarked that an admixture of benzol with petrol raises the critical temperature very markedly, so that an engine which knocks badly on pure petrol runs quite smoothly on a mixture of equal parts of benzol and petrol.

The fact that benzol requires a higher temperature to cause it to ignite was shown in a fairly direct manner by fitting a thin platinum wire in the combustion space of an engine and passing a current through this wire. The spark being retarded, the current through the wire was gradually increased till an examination of the indicator diagram showed that the charge was being fired by the wire. Under these conditions a larger current had to be passed in the case of benzol than was required with petrol. Further, with petrol the current strength could be easily adjusted so that the engine continued to fire and run quite regularly when the spark was turned off. With benzol it was much more difficult to get the engine to run in this way, and the current required was greater than with petrol.

3. *Alcohol.*—Measurements were also made, using ordinary methylated spirit as fuel. The ordinary Daimler two-jet carburettor was employed, a much larger jet being inserted than that used with petrol or benzol. It was further found necessary to supply additional heat to the carburettor, which was obtained by passing a current through a wire wound round the pipe leading from the jet chamber to the throttle. Even so, the supply of heat was not sufficient, and it was found that owing to the somewhat irregular vaporisation of the fuel the exhaust gas measurements were more irregular than with the other fuels.

The mean effective pressures (Fig. 3) obtained with alcohol were very slightly higher than those obtained with either petrol or benzol, while they increased more rapidly with the strength of mixture than was the case with either of the other fuels, so that even with the strongest mixture used (six of air to one of alcohol), which gave 6 per cent. of CO in the exhaust, the mean effective pressure still showed a sign of increasing with the strength of the mixture. This is a point which may be of some practical importance, as if, as is ordinarily the case, the carburettor is adjusted to give approximately maximum power, there will be a very appreciable loss due to incomplete combustion.

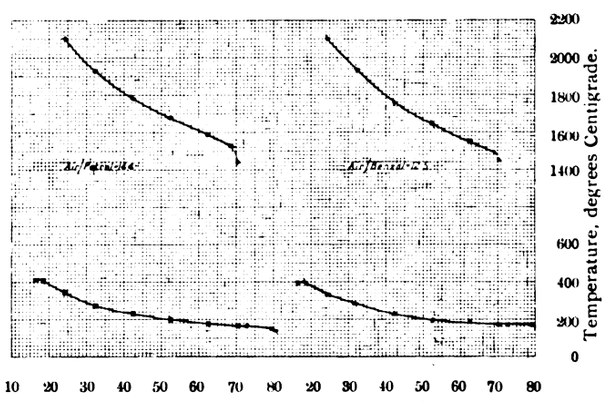

Fig. 9.

The composition of the exhaust gases with alcohol is given in Fig. 5. The character of the curves is similar to those obtained with the other fuels, and although, as has already been mentioned, the individual measurements were not in as good agreement as could have been wished, the means as given by the curves are probably quite accurate enough for all practical purposes.

The lower calorific value of the methylated spirit used was 9,750 B.Th.U. per pound, and was determined by burning the spirit in an ordinary spirit lamp carried on the arm of a balance, the heat produced being measured with a Boys' calorimeter.

4. *Efficiency and Temperature.*—The thermal efficiency obtained with the three fuels at a speed of 800 revs. per minute is given for different mixture strengths in Fig. 4. The cross on each curve indicates the strength of mixture for which combustion is just complete. It will be seen that the maximum thermal efficiency, as also that at complete combustion, increases slightly as we go from petrol to benzol and from benzol to alcohol.

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With a view to studying the cause of the different thermal efficiencies, the mean temperature of the gases in the cylinder have been worked out from the indicator diagram. For this purpose two indicators were used, a three-way cock enabling one or other to be connected to the cylinder. One indicator was fitted with a thick diaphragm, and was used to give the pressure on the compression and expansion stroke.

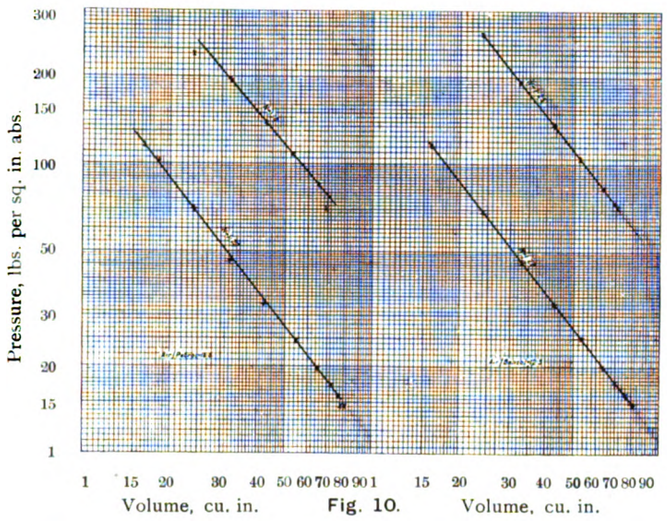

Fig. 10.

The other had a thin diaphragm, and was used to give the exhaust and suction stroke pressure.

A calculation of the exhaust temperature was first made, assuming a suction temperature of 147 deg. C., and then from the measured amount of the fresh charge taken in at each stroke, the suction temperature obtained by mixing this amount of fresh charge at the temperature at which it was taken in with the quantity of the residual gases at the temperature just calculated, was determined. From this suction temperature the temperature corresponding to any other point on the indicator diagram could then be calculated. Of course, a correction was made to allow for the expansion which takes place owing to the chemical changes which occur during combustion. In Fig. 9 are given the temperatures at different points on the compression and expansion curves, for one test using petrol as fuel and another using benzol. In Fig. 10 the pressures and volumes, read off the indicator diagrams, for these two tests are plotted on a logarithmic scale. It will be noticed that in each case the points lie on straight lines, which shows that both the compression and expansion lines follow the law

$$PV^n = \text{constant}$$

where n is a constant for any given line. The values of n are written alongside the different curves.

In Fig. 11 are given the temperatures for different strengths of mixture with the three fuels at various points on the expansion stroke, namely, 36 deg., 72 deg., 108 deg., and 126 deg. after the upper dead centre. With the Knight engine, 36 deg. after dead centre is about the earliest point at which the indicator diagram is quite free from disturbance due to the rapid explosion with petrol, since the spark has to be appreciably retarded if "knock" is to be avoided. The point 126 deg. after the dead centre is as near as can be judged the instant when the exhaust port opens, and so corresponds to the last point on the stroke at which the temperature can be deduced from the indicator diagram.* The lines marked "exhaust" give the temperatures calculated on the supposition that when the exhaust opens the gases expand down to the pressure on the exhaust line without gain or loss of heat. The dotted curve represents the measured temperature in the exhaust manifold of a four-cylinder petrol engine. This curve shows that the form of temperature curve obtained, namely, one showing a maximum temperature near the point of complete combustion, is correct, and further allows some idea to be formed of the drop in temperature of the exhaust gases due to loss of heat to the cylinder walls and to the water-cooled exhaust passages before the gases leave the engine.

It will be observed that the temperatures attained with the three fuels do not differ much, though those with alcohol are a little lower than the other two, particularly towards the latter part of the expansion stroke. This difference may be sufficient to account for the slightly higher thermal efficiency obtained with alcohol. There is, however, nothing in these temperature measurements to account for the fact that benzol gives a higher thermal efficiency than petrol.

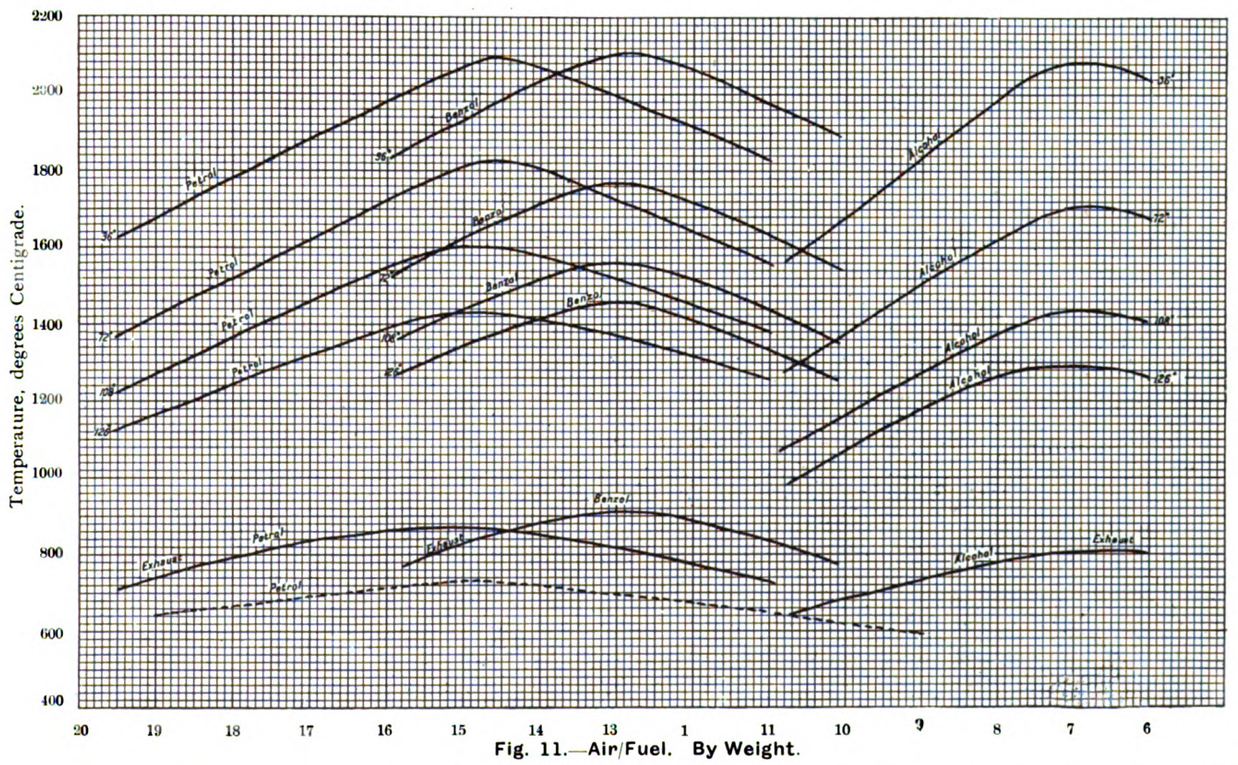

Fig. 11.—Air/Fuel. By Weight.

It may be mentioned that the suction temperatures, *i.e.*, the mean temperature of the gases in the cylinder at the commencement of compression, varied from 125 deg. C. to 145 deg. C.

5. *Influence of the Vapour Tension on Carburation.*—When an engine is hot and the carburettor is well heated, the vapour tension of the fuel

* From a consideration of Figs. 9 and 10 it would appear as if the exhaust really opened slightly before 126 deg. As, however, all the diagrams had been measured at 126 deg. and the calculations made, the values have been included in Fig. 11.

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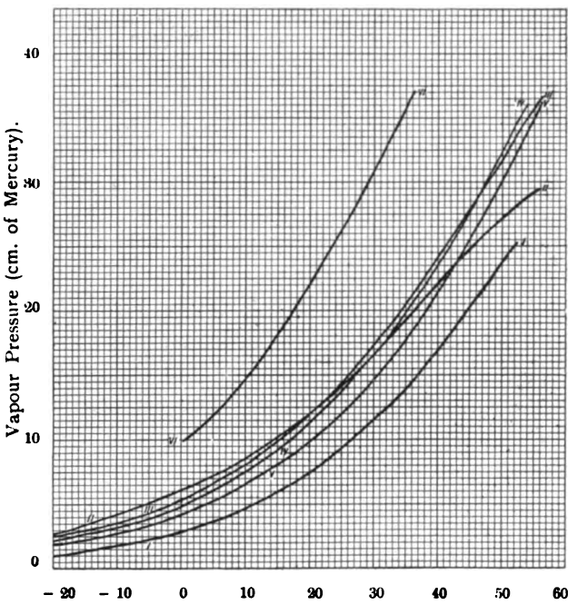
can be varied within fairly wide limits without appreciably affecting the running. When starting from cold, on the other hand, the contrary is the case, for unless the vapour tension of the fuel is *above* a certain limit it will be impossible to obtain an explosive mixture in the cylinder.

With petrol, which always contains a certain amount of a volatile constituent, this difficulty can be overcome by flooding the carburettor, so that a sufficient amount of the volatile constituent is evaporated to give an explosive mixture. With benzol and alcohol, however, there is no such volatile constituent present, and starting difficulties are met with in cold weather. This point was brought prominently before the notice of one of the authors when starting to make experiments on the explosion of mixtures of benzol and air in a closed vessel. Starting at atmospheric pressure and temperature it was easy to obtain an explosive mixture. On increasing the initial pressure, however, it was found that, no matter how much benzol was present in the bomb, no explosion would be obtained. The reason, of course, was that the



I. Benzol. II. Petrol (Pratt No. 1). III. Pratt 3 parts, Benzol 1 part. IV. Pratt 1 part, Benzol 1 part. V. Pratt 3 parts, Benzol 1 part. VI. Petrol (Bowley's special).

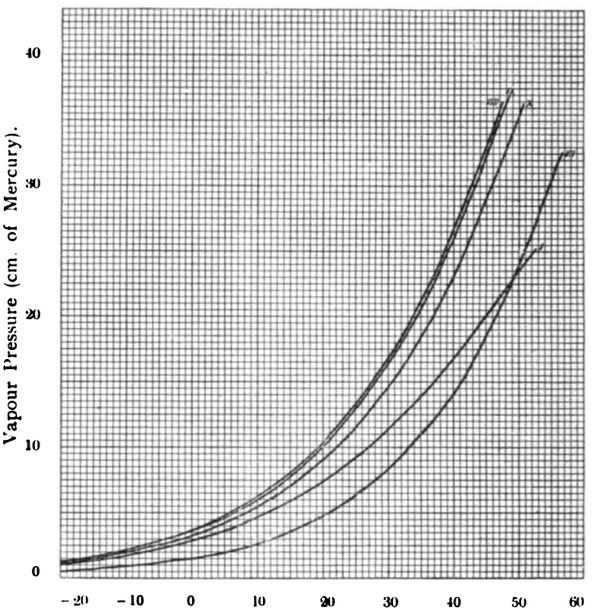
Fig. 12.—Temperature, Degrees Centigrade.

vapour pressure of the benzol was so low that the proportion of benzol vapour to air, even when the air was saturated, was below the limits of combustibility. To examine this point further, a series of measurements of the vapour pressure of petrol, benzol, alcohol, and mixtures of benzol with petrol and alcohol at different temperatures were made. A steel vessel was then constructed in which air saturated with these fuels could be fired by a spark. The vessel was surrounded by a water jacket, which enabled the temperature to be varied. A manometer was connected to the vessel as well as an arrangement which enabled the observer to tell whether the mixture fired when a spark was passed. The experiment consisted in placing some of the liquid fuel in the vessel and then pumping in air so that the pressure was higher than the maximum pressure at which the mixture would fire. The vessel, having been brought to the required temperature, it was well shaken to saturate the air. If, on passing a spark, no explosion took place, the pressure was slightly decreased, the vessel again shaken, allowed to stand for some time, and then a spark again passed. This procedure was continued till the pressure at which an explosion occurred was reached.

In Figs. 12 and 13 are given the vapour pressure curves of the various pure fuels and mixtures.†

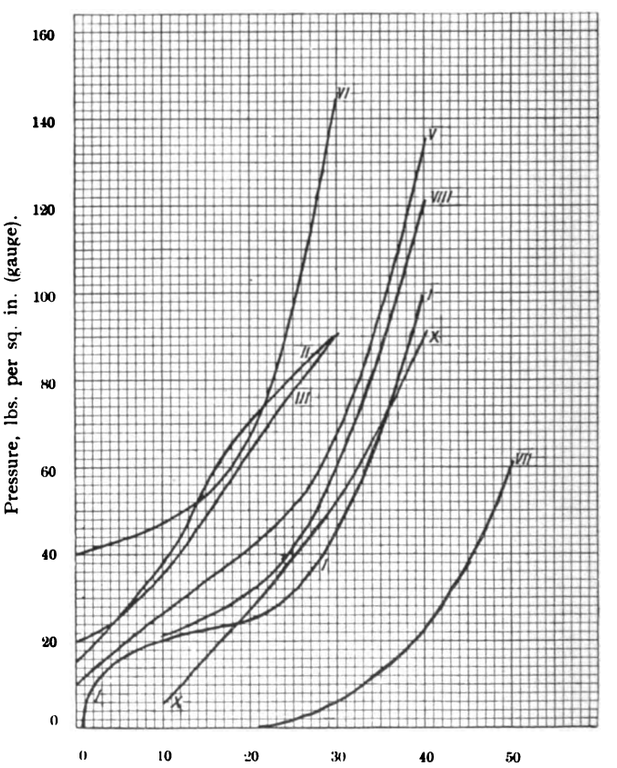
In Fig. 14 are given the minimum pressures at which air saturated with the vapour of the various fuels at different temperatures will explode.

A study of the curves will give a considerable insight into the starting-from-cold problem for various fuels. In the case of Bowley's special petrol we have a very volatile fuel, and it is seen that even at 0 deg. C. an explosive mixture can be obtained at 40 lb. per sq. in. With Pratt No. 1, although there is a rapid drop in the limiting pressure below 10 deg. C., yet quite a reasonable pressure is possible, the pressure being practically a linear function of the temperature. With benzol we get an entirely different type of curve. Beyond 20 deg. C. the



I. Benzol. VII. Methylated Spirit. VIII. Benzol 3 parts, Methylated Spirit 1 part. IX. Benzol 1 part, Methylated Spirit 1 part. X. Benzol 1 part, Methylated Spirit 3 parts.

Fig. 13.—Temperature, Degrees Centigrade.



I. Benzol. II. Petrol (Pratt No. 1). III. Pratt 3 parts, Benzol 1 part. V. Pratt 1 part, Benzol 3 parts. VI. Petrol (Bowley's Special). VII. Methylated Spirit. VIII. Benzol 3 parts, Methylated Spirit 1 part. X. Benzol 1 part, Methylated Spirit 3 parts.

Fig. 14.—Temperature, Degrees Centigrade.

† The compositions of the mixtures are given below the curves. The proportions of the constituents given are by volume.

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limiting pressure rises rapidly, while below 10 deg. C. there is an equally rapid fall. At temperatures below about 1 deg. C. even at atmospheric pressure air saturated with benzol vapour is incombustible. In the case of methylated spirit we have a regular curve, but at all temperatures less than 20 deg. C. air saturated with the vapour is incombustible even at atmospheric pressure.

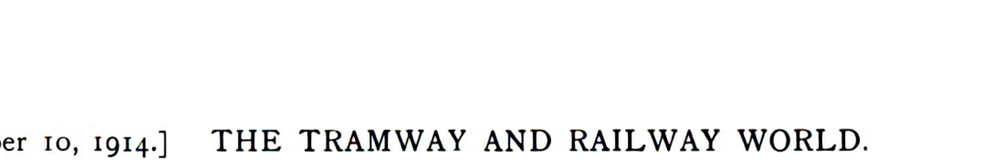
Mixture III (Pratt 3, benzol 1) behaves to all intents and purposes in the same manner as the pure petrol. Mixture V (Pratt 1, benzol 3) resembles pure benzol, except at low temperatures, where the influence of the petrol is quite marked. Mixture VIII (methylated spirit 1, benzol 3) resembles benzol, but is slightly better, a result which is supported by the vapour pressure curve (Fig. 13). Mixture X (methylated spirit 3, benzol 1) at the higher temperatures approximates to the benzol curve, but at the lower temperatures falls much below the pure benzol curve.

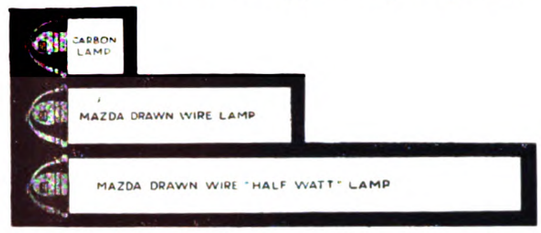
Those members who have attempted to adjust their carburettors so that the engine will start on the switch will probably find that considerable light will be shed on their efforts by the results given above. When we come to the question of starting an engine by giving it a swing either by manual power or with a mechanical starter, the question is a little more complex, for it is possible to draw the fuel into the engine in the form of a finely divided spray and then vaporise enough of this fuel by the heat developed by rapid compression to give an explosive mixture. In order to see what temperatures could be reached in this way, the Knight engine was fitted with a starting handle, and all being cold the engine was swung by hand. An indicator diagram of the resulting compression stroke was taken, and then the temperature at different points of the compression was worked out. It was found that when the temperature of the engine was 15 deg. C., starting with the piston in lower dead centre, the maximum mean temperature reached was 158 deg. C. and occurred about 15 deg. before top dead centre. After this maximum temperature had been reached, there was a somewhat rapid fall, so that at top dead centre the mean temperature was 146 deg. C. If the piston at the start was half-way between centres, as is ordinarily the case on the first turn of a four-cylinder engine, the maximum temperature reached was 95 deg. C.

It is thus evident that enough heat is generated by the compression to vaporise the fuel except, perhaps, in the case of alcohol, or in the case where the fuel is already vaporised to keep it in the form of vapour during the compression. In the experiment cited above, the engine was turned fairly rapidly. If the engine is only turned over slowly, then much of the heat due to the compression will be lost to the cylinder walls. That this loss is considerable is shown by the drop of temperature near the top dead centre where the piston is moving comparatively slowly and the surface/volume ratio is a maximum.

MAZDA HALF-WATT LAMPS FOR MOTOR CAR LIGHTING.

We have received a list issued by the British Thomson-Houston Company, Limited, dealing with Mazda "half-watt" lamps of six, eight, and 12 volts for motor car use. The introduction of Madza half-watt automobile lamps is bound to have a very beneficial effect on the whole question of the electric lighting of motor cars. In one step the lamp efficiency has been doubled. The list describes and illustrates the advances which have been made in the electric lighting of cars. Starting from the first electric bulb, we have the carbon filament lamp which required considerable energy for the light given—a fact which seriously militated against more general employment. It can be stated that the electric lighting of motor cars was never seriously considered or adopted till the production of the Mazda drawn-wire automobile lamp with its helical point tungsten filament. This method of filament coiling and bunching approximates as closely as is possible in lamp making to the theoretical point source of light so necessary for efficient results with parabolic reflectors. The effect of this type of lamp with its sturdy drawn-wire filament was immediately apparent by the increase in the number of electrically-lighted cars. It was four times as efficient as the carbon filament lamp; in other words, the same light could be obtained for one-fourth the energy or battery capacity, or four times the light for the same energy or battery capacity. Now comes the new Madza "half-watt" automobile lamp, with its coiled tungsten filament in a gas-filled bulb. This type of lamp is eight times more





Relative volume of light of equal intensity obtained with various types of lamps for same energy consumption—showing the great advance in efficiency secured by the new Mazda "Half Watt" Automobile electric lamp.

efficient than the carbon lamp, and twice as efficient as its immediate predecessor. The advances made are graphically shown in the accompanying diagram.

The Mazda half-watt automobile lamp has the same characteristics as the large Mazda half-watt lamps, which are being so successfully used for street lighting, works lighting, etc., in so far as the quality of the light is much whiter in colour and approximates very closely to daylight. In addition the intrinsic brilliancy is eight times that of the ordinary tungsten lamp. The lamps have also great mechanical strength, giving an excellent life fully equal to that of previous lamps. The great gain in efficiency and brilliancy of the new Mazda half-watt automobile lamp is not therefore obtained by the sacrifice of any other desirable quality. It is interesting to note that the gas filling of the half-watt lamps, both of large candle powers and for automobile use, is below atmospheric pressure, and as the gas is an inert gas it cannot ignite or explode.

The candle powers of the Mazda half-watt automobile lamps range from 24 to 100, from two to four amperes. The exact size of one of the new lamps is shown in an illustration. It will be observed that the Mazda half-watt automobile lamp is in appearance the same as the ordinary Mazda automobile lamp which has had such a wide vogue; but there is the important difference that the filament burns in a gas-filled bulb instead of in a vacuum. It is this improvement which is responsible for the double efficiency.

Full particulars and complete range of size and prices of these new lamps may be obtained on application to the British Thomson-Houston Company, Limited, Mazda House, 77, Upper Thames Street, E.C.

MOTOR FIRE ENGINES.—Among the local authorities which have recently purchased motor fire engines are the following: Chester Town Council, Denton Town Council, Teddington Urban District Council, Exmouth Urban District Council (price £1,060), Tottenham Urban District Council (price £620). Southampton Town Council are considering tenders for the conversion of its present horse-drawn fire engines to motor vehicles, and Northampton Town Council propose to purchase a motor tractor for their fire engine.

DUNLOP RUBBER COMPANY.—A dividend of 15 per cent. on the ordinary shares for the financial half-year is recommended. The net profits of the company for the 12 months were £381,919 after providing for debenture interest and prior charges, and £37,679 was brought forward. An interim dividend at the rate of 10 per cent. per annum has been paid on the ordinary shares, and a further distribution at the rate of 20 per cent. per annum is proposed, making 15 per cent. for the year, writing £5,000 off goodwill, patents, etc., adding £175,000 to the reserve (raising that fund to £925,000) and carrying forward £33,241.

THE WOLSEY COMPANY AND BATTERY VEHICLES.—The Wolsey Motors, Limited, have taken over the selling rights of the Baker electric battery vehicles, which, although new in this country, have made a reputation in the United States. The chassis is made in five sizes, comprising light delivery vans for loads of 10 cwt. and one ton, and vehicles for various services with carrying capacity of two, four, and five tons. At the moment only one of the 2-ton models can be supplied, but we understand that the other models are expected to be shortly available. These vehicles are fitted with batteries of iron-clad exide cells.

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MOTOR TRAFFIC.

MOTOR TRAFFIC NOTES.

THE WESTMINSTER GUARDIANS have ordered a motor brougham from Napier and Sons, Limited.

EDINBURGH CORPORATION is to purchase an electric motor lorry for the use of the electricity department.

SHEFFIELD TRAMWAYS COMMITTEE have decided to purchase a 15-H.P. Armstrong-Whitworth motor chassis at a price of £375.

THE HESTON AND ISLEWORTH URBAN DISTRICT COUNCIL intend to purchase an electric battery-driven vehicle for house refuse collection.

THE ITCHEN URBAN DISTRICT COUNCIL have obtained the sanction of the Local Government Board for powers to borrow £600 for the purchase of an interchangeable steam wagon for street watering and haulage.

BIRMINGHAM MOTOR OMNIBUSES.—It has been found necessary to rearrange some of the motor omnibus services in Birmingham, and to suspend others temporarily, owing to a number of the vehicles having been requisitioned by the War Office.

BRIGHTON-HOVE RAILLESS SCHEME.—Hove Council have declined the proposed conference with Brighton Corporation on the scheme for the equipment of certain through trolley omnibus routes. It will consequently be necessary to go to arbitration.

A MOTOR SERVICE IN TASMANIA.—An excellent passenger motor service is maintained by the Government Railway Department between Sorham and Zeehan in Tasmania. Some time ago there was a likelihood of its being withdrawn, as the authorities did not consider it received sufficient support. A public meeting of residents, however, was called to protest against this step being taken, and this has had the effect of securing a continuance of the service and of adding considerably to its popularity.

"COMMER" CARS AND THE WAR.—The Canadian troops which are now stationed at Salisbury Plain have brought with them eight "Commer" cars from Canada. The Indian contingent has another fleet of "Commer" cars, and the British Government has over 500 in use. Russia has impressed 40 of these vehicles, and the French Government have also been making use of the "Commer" cars for the transportation of troops in Algiers. The factory of Commercial Cars, Limited, is busily engaged in building its heavier models exclusively for the War Department.

"KARRIER" SUBSIDY MODEL.—The illustration below shows two of the War Office subsidy wagons which Messrs. Clayton and Company, of Union and Standard Works, Huddersfield, are supplying to the Government in regular batches of five per week. In order to accelerate their output for the War Office, and at the same time endeavour to fill some of the large number of orders they have in hand for replacements from

The Karrier Subsidy Model.

customers whose vehicles have been commandeered, Messrs. Clayton have decided to enlarge considerably their Standard works, where in the past the firm's repair department has been concentrated. When the new buildings are complete the whole of the Standard works will be occupied with new work, and the repair section transferred to the Union works.

THE STOKE-ON-TRENT TOWN COUNCIL appear to have brought their negotiations with the Potteries Electric Traction Company to a practical conclusion with regard to increased transport facilities. Extensions of a number of motor omnibus routes will as a consequence be inaugurated in the district.

THE COVENTRY CHAIN COMPANY, LIMITED, Spon End, Coventry, inform us that 130 of their employees have rejoined the colours or enlisted since the beginning of the war. They hope to reinstate all those who re-apply at the conclusion of hostilities. The company are paying reservists' wives 7s. per week, and 1s. for each child.

THE KELBURNE AND KARORI MOTOR OMNIBUS COMPANY, LIMITED, of New Zealand, have installed a service of Argyll 25-seater vehicles with which it is intended to maintain connections between the suburb of Karori and the city tramway system. The City Council have also on order three Tilling-Stevens petrol-electric omnibuses of the standard type which they intend to run in connection with their tramway services.

LONDON MOTOR 'BUS ROUTES STOPPED.—About 500 motor omnibuses on 50 routes in London have been requisitioned by the military authorities, most of them for service on the Continent. The destination boards on these vehicles have been changed, and are now marked to Potsdam, to Berlin, or to Vienna, as the case may be. It is reported that the gaps caused in the number of vehicles are being filled at the rate of nearly 40 a week.

MESSRS. DENNIS BROTHERS, LIMITED, have designed a new type of motor ambulance for the London County Council. In this machine the rear axle is carried on long cantilever springs, the torque tube being fitted at its forked end with rubber buffers. The body is also provided with substantial rubber blocks at the points where it is mounted on the chassis. The net result of this extra resiliency is claimed to be of great benefit to the passenger.

"ALUMINIUM IN THE CONSTRUCTION OF AUTOMOBILES" is the title of an interesting 16-page pamphlet just issued by the British Aluminium Company, of 190, Queen Victoria Street, E.C. The pamphlet contains much useful information as to the various parts of motor cars which can now be supplied by the company in aluminium. Although intended to cover principally the automobile industry, the information applies also to the construction of tramway and railway cars. The external panelling of these, as well as some internal panels, can now be supplied with a finish which gives a pleasant and distinctive appearance to the cars. The Aluminium Company has also published a pamphlet on "Aluminium in Electric Railway Engineering."

ELECTRIC OMNIBUSES IN BRIGHTON.—Mr. E. A. Eager, motor superintendent of the Brighton, Hove, and Preston United Omnibus Company, Limited, draws attention to an error in a paragraph in our issue of November 5 on "The Progress of the Electric Omnibus." It was there inadvertently mentioned that Brighton was included among several Corporations now using electric omnibuses. Although electric omnibuses have been in service in Brighton since June, 1908, they are not run by the Corporation, but by the Brighton, Hove, and Preston United Electric Omnibus Company, and are worked by them in conjunction with their petrol fleet. The electric vehicles number 16. Twelve of these are of the same type as the omnibuses used some time ago in London; some of them, in fact, being the same vehicles, and as previously mentioned they are equipped with Tudor batteries.

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THE

Tramway & Railway World

Vol. XXXVI. No. 30. | LONDON, SATURDAY, DECEMBER 12, 1914. | [Established in 1892.

ANNUAL SUBSCRIPTION (Postage Prepaid)—in the United Kingdom, 25s.; for all places abroad, 30s.

Including sixty-four issues, of which twelve are large illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."

Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

CITY OF MELBOURNE, AUSTRALIA.

SUPPLY OF INSULATED COPPER CABLES.

Tenders are invited for the supply of—

2,200 yds., 1.0 sq. in. Single Conductor Lead Covered Cable.
1,060 ,, 0.5 ,, ,, ,, ,, ,, ,,
2,720 ,, 0.3 ,, ,, ,, ,, ,, ,,
1,250 ,, 0.15 ,, ,, ,, ,, ,, ,,

Specification, tender form, etc., can be obtained on application to the undersigned.

Such application must be accompanied by a deposit of 5s., which will be returned on receipt of a *bona-fide* tender.

Tenders to be sent to the undersigned, endorsed "Tenders for Insulated Copper Cables," and must be received by them not later than 12 noon of Wednesday, January 6, 1915.

The Council reserves to itself the right, but does not bind itself to accept, the whole or any portion of any tender.

McIlwraith, McEacharn and Co. Ppty. (Ltd.),
Billiter Square Buildings, London, E.C.,
Agents for the Melbourne City Council.

CITY OF MELBOURNE, AUSTRALIA.

SUPPLY OF SINGLE-PHASE TRANSFORMERS.

Tenders are invited for the supply of Six 100 K.V.A. Single-Phase Transformers.

Tender form, specification, etc., can be obtained on application to the undersigned.

Such application must be accompanied by a deposit of 5s., which will be returned on receipt of a *bona-fide* tender.

Tenders to be sent to the undersigned, endorsed "Tenders for Transformers," and must be received by them not later than noon of Wednesday, January 6, 1915.

The Council reserves to itself the right, but does not bind itself, to accept the whole or any portion of any tender.

McIlwraith, McEacharn and Co. Ppty. (Ltd.),
Billiter Square Buildings, London, E.C.,
Agents for the Melbourne City Council.

BOROUGH OF HORNSEY.

The Town Council invite tenders for the supply, delivery, and complete erection of Low-Tension Switchgear, etc.

Forms of tender may, after 10s. 6d. has been deposited with the Borough Treasurer in respect of each tender (to be refunded to *bona-fide* tenderers after tenders have been considered), be obtained of the Borough Electrical Engineer, at the Electricity Works, Tottenham Lane, Hornsey, N.

Tenders, endorsed "L.T. Switchgear," to be delivered, or sent by post, so as to be received in the Town Clerk's Office by 10 a.m. on Saturday, the 2nd proximo.

The Council reserve to themselves the right to decline all, or any, or any portion of any, of the tenders sent in.

F. D. Askey,
Town Clerk.

Town Clerk's Office,
99, Southwood Lane, Highgate, N.,
December 9, 1914.

THE GREAT INDIAN PENINSULA RAILWAY COMPANY.

The Directors are prepared to receive tenders for the supply of the following Stores, namely:—

Spare Parts of Carriages and Wagons.	Station Bells, Bib Cocks, etc.
Helical Springs.	Brass and Iron Screws.
Mild Steel Plates, Sections, Bars, etc.	Spring Steel.
Screw Jacks, etc.	Wrought Iron (Grade "B").
Anvils.	Cloths, etc.
	Copper Plates and Rods.
	Pig Iron.

Specifications and forms of tender may be obtained at this office on payment of the fee for the specification, which payment will not be returned.

Tenders must be delivered in separate envelopes, sealed and addressed to the undersigned, marked "Tender for Spare Parts of Carriages and Wagons," or as the case may be, not later than 11 o'clock a.m. on Thursday, December 17, 1914.

The directors do not bind themselves to accept the lowest or any Tender.

R. H. Walpole,
Secretary.

Company's Offices, 48, Copthall Avenue, London, E.C.,
December 8th, 1914.

CITY OF LEEDS.

ELECTRIC LIGHTING DEPARTMENT.

OVERHEAD TRAVELLING CRANE.—COAL AND ASH CONVEYING PLANT.

The Leeds City Council are prepared to receive tenders for the supply and erection of the following plant:—

(*a*) An Overhead Travelling Crane, electrically driven to lift 60 tons with a span of 70 feet.

(*b*) Coal and Ash Conveying Plant.

Copies of general conditions, specifications, and forms of tender may be obtained from Mr. C. Nelson Hefford, Manager of the Department, 1, Whitehall Road, Leeds, on payment of a deposit of two guineas for each specification, which deposit will be refunded on receipt of a *bona-fide* tender.

Tenders must be in the forms attached to the respective specifications, and must be delivered to me at the Town Hall, Leeds, not later than 11 o'clock in the forenoon of Friday, the 22nd day of January next, in sealed envelopes endorsed "Electric Lighting—Tender for Crane" or "Electric Lighting—Tender for Conveying Plant," as the case may be.

The Corporation do not bind themselves to accept the lowest or any of the tenders sent in.

Robert E. Fox,
Town Clerk.

Leeds, December 9, 1914.

WALTHAMSTOW URBAN DISTRICT COUNCIL.

TO UNIFORM CONTRACTORS.

The Walthamstow Urban District Council invite tenders for the Supply of Uniforms for their Tramway Employees during the twelve months ending March 31, 1916.

Forms of tender and further particulars may be obtained from Mr. William Murray, A.I.E.E., Tramways Manager to the Council, Tramway Offices, Chingford Road, Walthamstow.

Sealed tenders endorsed "Tender for Tramways Employees' Uniforms" to be delivered by post only to the undersigned not later than 5 o'clock p.m. on Wednesday, December 23, 1914.

The Council do not bind themselves to accept the lowest or any tender, and reserve to themselves the right to accept the whole or any part of a tender.

The contractors will be required to pay the whole of their workmen such rate of wages, and observe such hours of labour as are recognised by the various Trades Unions and in force at the time of signing the contract.

C. Sydney Watson,
Clerk to the Council.

Town Hall, Walthamstow,
December 9, 1914.

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BOROUGH OF HORNSEY.

The Town Council invite tenders for the supply, delivery, and complete erection of Extra-high Tension Switchgear, and also for the supply and delivery of Extra High Tension Three-core Cable.

Forms of tender may, after 10s. 6d. has been deposited with the Borough Treasurer in respect of each or either of the above tenders (to be refunded to *bona-fide* tenderers after tenders have been considered), be obtained of the Borough Electrical Engineer, at the Electricity Works, Tottenham Lane, Hornsey, N.

Tenders, endorsed "Tenders for E.H.T. Switchgear" or "Tenders for E.H.T. 3-Core Cable," to be delivered or sent by post, so as to be received in the Town Clerk's office by 12 (noon) on Tuesday, the 29th inst.

The Council reserve to themselves the right to decline all, or any, or any portion of any, of the tenders sent in.

F. D. ASKEY,
Town Clerk.

Town Clerk's Office, Town Hall,
99, Southwood Lane, Highgate, N.,
December 1, 1914.

GREAT NORTHERN RAILWAY COMPANY (IRELAND).

TO ELECTRICAL CONTRACTORS.

The Directors are prepared to receive tenders for the supply of Electrical Plant and Materials at their Dundalk Works, as under :—

Electric Motors and Accessories.
Sub-Station Switchboard.
Hard Drawn Copper Wire.
Bitumen Wires.

Drawings, specifications, and form of tender can be obtained from the undersigned on payment of one guinea, which will be refunded on receipt of a *bona-fide* tender and the return of the drawings.

Tenders made out on the forms supplied by the company should be delivered under sealed cover, endorsed "Tender for Electrical Plant, Dundalk," to the undersigned not later than 10 a.m. on Monday, December 21, 1914.

The Directors do not bind themselves to accept the lowest or any tender.

T. MORRISON,
Secretary.

Secretary's Office,
Amiens Street Terminus, Dublin,
November 30, 1914.

CITY OF MANCHESTER.

The Electricity Committee of the Manchester Corporation are prepared to receive tenders for the supply, delivery, and erection at their Stuart Street Generating Station, of Three Reactance Coils.

Specifications and forms of tender may be obtained on application to Mr. F. E. Hughes, Secretary, Electrical Department, Town Hall, Manchester.

Further particulars and information can be obtained on application to Mr. S. L. Pearce, Chief Electrical Engineer, Dickinson Street, Manchester.

Tenders, duly endorsed and addressed to the Chairman of the Electricity Committee, must be delivered at the Town Hall, not later than 10 a.m. on Monday, the 21st instant.

The Corporation do not bind themselves to accept the lowest or any tender.

THOMAS HUDSON,
Town Clerk.

Town Hall, Manchester,
December 1, 1914.

DANISH STATE RAILWAYS.

The Danish State Railways invite tenders for the delivery of about 13,200 Tons of Rails and Fastenings.

Specifications and drawings to be obtained on payment of the sum of 2 sh. (which will not be returned) on application to "Banekontoret," Gl. Kongevej 1 E, Copenhagen B, where tenders will be received not later than 3 o'clock p.m. on December 29, 1914.

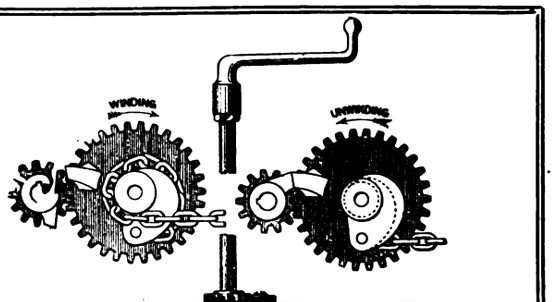
(Continued on page 441.)

TRAMWAY SUPPLIES, Ltd.,
Tramway Engineers,
Sole Selling Agents for S. Dixon & Sons' Tramway Material,
160, WOODHOUSE LANE, LEEDS.
Sole Manufacturers of
TURNER'S PATENT AUTOMATIC POINT CONTROLLERS.
Telegrams: "Controllers, Leeds." Telephone: 3488 Leeds.
OVERHEAD LINE MATERIAL AND SUPPLIES.

Pole Paints &RO
As supplied to important Companies at home & abroad. Durable, ready-mixed, permanent colours that defy rust and exposure. Samples & Prices on request.
Robert KEARSLEY & Co., Ltd.
RIPON, England

MILLARS' TIMBER AND TRADING CO., LTD.
PINNERS' HALL, GREAT WINCHESTER STREET, LONDON, E.C.,
beg to inform their Customers that the War has not interfered with their production of
JARRAH for Wood Paving,
and they are in a position to give prompt deliveries from stocks in this country.

SPECIAL Car Varnish
for finishes of great durability and brilliant lasting lustre.
Sole Manufacturers:
PINCHIN, JOHNSON & Co, LTD.,
Minerva House, Bevis Marks,
LONDON, E.C.



The "Peacock" IMPROVED Brake
(PATENT).
Note the simplicity of the Radial Contact pieces which render this the quickest of all geared hand brakes by
(1) Preventing the drum from over-running on release;
(2) Stopping the drum always at the point from which recovery of chain is most rapid;
(3) Eliminating all idle turning of the handle.
THE "PEACOCK" BRAKE CO., 27, CLEMENTS LANE, LONDON, E.C.

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THE
Tramway AND Railway World

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SATURDAY, DECEMBER 12, 1914.

BRAKE EQUIPMENT.

Two recent accidents, accompanied by loss of life, again draw attention to the fact that there is still the necessity for further attention to the question of brakes. As tramway traffic increases, it is more insistently imperative that no effort should be neglected to make our tramway cars as safe as human skill can make them. It is not enough that they should be capable of being safely operated with reasonable care, but they ought to be so equipped that even when unusual carelessness is shown the errors can be rectified before the results become serious. It cannot be questioned that the majority of accidents in which cars run away and overturn are due in the last analysis to the locking of the wheels and the skidding of the car. What, therefore, is needed is some method of preventing the locking of the wheels, and there have been various attempts to secure this, but they are not in general use. The whole subject of brakes was carefully studied some years ago by committees of the two tramway associations, and these committees put on record the conditions which should be fulfilled by a perfect brake. Since then a number of new brakes, or of improvements on existing patterns, have been devised. Some of these have been tried; others have not yet had tests of sufficient thoroughness to enable them to be considered as anything more than well-meant experiments. Among those which have had an extensive trial is a brake described in our issue of May 7 last. This brake has the feature, in common with some others, of directing the maximum pressure on the blocks on the rails and not on the wheels. In this way the danger of a car overturning on rounding a curve is largely removed. This brake, designed by Messrs. C. J. Spencer and J. W. Dawson, has since been developed, and it has now reached such a stage that, as mentioned in another column, Sheffield Corporation have just decided to equip a number of their cars with it. The brake is also working well in Birmingham, and there is sufficient evidence to show that it is a valuable contribution to the progress of tramcar equipment. Although somewhat costly, if it proves a sufficient safeguard, its use would certainly be justified, particularly on lines where steep gradients are numerous, as is the case especially on many midland and northern tramways. The brake in question has come through a long period of development. It may be susceptible of further improvement, but it appears to have reached a stage which entitles it to receive the careful consideration of those who are responsible for the safety of tramway passengers. Municipal authorities, in particular, should always be ready to extend encouragement to all inventions that give promise of improving the factor of safety of their tramways. Their sole object in carrying on the business of tramway management is public welfare, and no question of cost should be allowed to stand in the way of the equipment of the cars with the best-known safety appliances. It cannot be denied that on many tramway routes the conditions are exacting: steep gradients, with sharp curves, exact a penalty for any carelessness or weakness of equipment.

THE DEVONPORT TRAMWAY ACCIDENT.

The Board of Trade, on December 3, held an inquiry into the tramway accident which occurred on November 27 at Devonport. Mr. George Cardwell, engineer and manager of the Devonport and District Tramways Company, stated that he had examined the car, which had overturned at the bottom of a hill. He found that the wheel brake was fully on, and the brake chain quite tight. The foot ratchet pawl was in position holding the brake blocks on to the wheels. The track brake was off, and the brake chain was quite slack. The handle of the controller was at the "off" position, and the electric emergency stop was fully on. There were distinct flats on the two rear wheels and the wheel tires showed burning. There were signs of small flats on the two front wheels. In the past he had found that the brakes employed controlled cars quite satisfactorily. His opinion as to the cause of the accident was that the car approached the curve at the foot of the hill with locked wheels, and consequently refused to negotiate the curve, with the result that it turned over. There were no signs of any scores on the setts, which the wheels would make if the car had jumped the line. The car had been in use for ten years, but it was reconstructed in 1912, and so far as he could judge was one of the best conditioned cars on the system.

Alfred Cheek, the driver of the car, said that he had been a motorman for about eighteen months. He noticed the car getting out of hand, so he applied the emergency brake and the hand brake and used the sand-box. The emergency brake nearly brought the car up at the bottom, and he had no doubt as to the efficiency of the brakes at the time. He also applied the slipper brake at the top of the hill.

William Riley, the conductor, stated that he noticed that the car had passed a Board of Trade stopping place and was gathering speed as it neared the bottom of the hill, but it slowed up and was not going very fast when the curve was reached, but it toppled over.

Mr. A. W. A. Chivers said that he had examined the car, and in his opinion the accident was due to the car having run away. He thought that the driver probably allowed his car to travel at a speed in excess of that allowed by the Board of Trade, and that when he attempted to make the Board of Trade stop at Trafalgar Road he probably locked the wheels and the car commenced skidding. He appeared to have persevered with the brakes, and, judging from the reported speed of the car at the curve, he probably reduced the speed at the bottom of the gradient to something slightly above that authorised by the Board of Trade. If that was so and the wheels had not been locked the accident would probably have been avoided.

After other evidence, Colonel Druitt, the Board of Trade officer, closed the inquiry, and he will make his report in due course.

RESULTS OF RAIL WELDING AT SHEFFIELD.

Mr. W. J. Hadfield, surveyor of highways of Sheffield, in his report for the year ended in March last, which has recently been issued, speaks highly of the advantage of rail welding. The track mileage (measured as single track) increased during the year from 80 miles 5 furlongs to 82 miles. The cost of repairs showed a considerable increase, principally due to heavy expenditure on electrically welding worn rail-joints. This undoubtedly has had the effect of postponing renewals, and for the past year the renewals account was reduced by £1,804. The improvement resulting from electrical welding of old rails can easily be judged by a trip over the Nether Edge route, where large numbers of joints have been dealt with, although others remain unwelded. The combined cost of repairs and renewals for 1913-14, although slightly in advance of that for the previous year, is considerably below the figure for the year 1911-12, and it is not anticipated that this year's figure will quite reach that for the year just ended. The practice of welding all new track on the Thermit system has been continued, and up to March 25, 1914, there were 2,268 Thermit joints.

The principal work of the year was the doubling and extension of the Crookes route at a total cost of £13,325. Of this £1,098

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was chargeable to renewals, the remainder to capital. Another important item was the doubling of the South Road section of the Walkley route. This work cost £5,489, of which £1,830 was chargeable to renewals. The Middlewood Road track was extended to the city boundary at a cost of £3,513, and permanent way was laid in the Holme Lane car sheds at a cost of £2,980. A much-needed doubling and renewal also took place on the Woodseats route near Woodbank Crescent, at a total cost of £1,594.

TRAMWAYS AND THE WAR.

CHRISTMAS GIFTS FOR THE TRAMWAYMEN AT THE FRONT.—At a meeting of the Liverpool Tramways Committee, Mr. E. Russell Taylor presiding, an interesting suggestion was made by Mr. John Clancy and promptly adopted by the members of the committee. There are over 700 men from the Corporation tramway service at present fighting at the front, and in order to mark the committee's appreciation of their patriotism it was decided, on the initiative of Mr. Clancy, to send each of them a Christmas present in the shape of a woollen helmet, muffler or some other gift which will add to their comfort and protect them against the severe weather.

GLASGOW.—Mr. Dalrymple, general manager of Glasgow Corporation Tramways, has received letters from tramway men who are serving at the front thanking those who organised the gift of tobacco pipes which were sent out to the men. Mr. Horace Jowl, who is in the Army Service Corps, in his letter, said that they were now feeling the pinch of both the war and winter, but they were contented with the knowledge that they were doing their best for King and country. Mr. A. E. Simmons, who is attached to the anti-aircraft section, in his letter said:—"Firing here is going on night and day, and the way our infantry stick it seems to be beyond human endurance. South Africa was a picnic to this as regards firing, but our commissariat is far better than in that war. Troops are being very well fed under the conditions that exist at present. It is bitterly cold, and we have had rain for days, then frost, and now the ground is covered with snow, which makes a very pretty picture. We get no news about what is going on, only by a newspaper now and again, so, you see, you know more than us about what is going on. Our section has brought down three or four German aeroplanes that came spying over our lines. Our aeroplanes are very good, and the pilots are very daring. The Prince of Wales was in our lines a day or two ago. I am pleased to say that the majority of our section are keeping fairly well."

NEWCASTLE.—Alderman J. H. Rodgers, chairman of Newcastle Tramways Committee, at a recent meeting of that body, stated that no fewer than 226 motormen and conductors had joined the Army, and out of the whole of the departments the number was 250. While they were without 226 motormen and conductors, they did not feel that they ought to engage men who could join the Army, and this fact was making their choice rather limited. They had at present secured 128 new hands, and other 40 were being trained, making a total of 168 men, which meant that they were 58 men short of their number, although the traffic was exceptionally heavy at present. The committee was obliged to the citizens for their leniency in these trying times, because there was no doubt that many of the cars were crowded owing to the want of men to work the system as in normal times. This would be corrected as soon as possible. The allowance to the men was a heavy item, inasmuch as the committee was making up the men's wages for the dependents to what was being received while they were at work. This accounted for £100 to £150 a week. During the mobilisation they allowed all soldiers to ride on the cars free. This was, for certain reasons, discontinued, and they had now introduced a system by which soldiers' tickets were being issued in book form, similar to workmen's tickets.

BURNLEY.—Mr. H. Mosley reports that 136 employees of the tramway department have now joined the colours, and he has reached the minimum number with which the service can be properly worked. Further applications to enlist are to be considered by a special committee. It is not, however, the intention of the committee to stop recruiting. Over £80 weekly is being paid to employees in the tramway department serving with the forces.

WESTINGHOUSE EMPLOYEES.—A total of 1,046 men have left the British Westinghouse Company to join the forces.

Destruction of the Edison Works.—The works of the Edison Electric Company at West Orange, New Jersey, were almost totally destroyed by fire on Wednesday evening. Mr. Edison's laboratory and the storage battery factory were saved, but twenty buildings were ruined, throwing 4,000 people out of employment. Mr. Edison said to an interviewer after the fire: "I am 67 years old, and this is a great set back, but I shall start again immediately to rebuild the factories." It is stated that the damage amounted to over £1,000,000, which was less than half covered by insurance.

The Barnsley Accident.—A coroner's inquiry regarding the death of two women owing to a tramcar accident at Barnsley on December 2, was held on December 4. The coroner, in summing up, said that he thought that there was no criminal neglect on the part of the driver and conductor of the car, though they had been very careless. He thought that the rules should be more stringent, and the driver ought not to leave his car without notifying the conductor, while the conductor ought not to release the brakes so as to start the car before making sure that the driver was in his place. The jury returned a verdict of accidental death, and expressed the opinion that there had been carelessness on the part of the driver and conductor.

PRICE OF EDINBURGH TRAMWAYS.

As mentioned in our last issue, the offer of the Edinburgh Tramways Company to sell their undertaking to the Corporation for £250,000 has been declined by the Committee, and unless some change takes place in the meantime the company will continue to work the tramways until June 30, 1919, when their lease expires. Although the company offered to sell the undertaking for £250,000, they valued it at £292,000, which sum is made up as follows:—

(*a*)	Value of cash and investments at estimated market value, less interest on debentures accrued, outstanding accounts, accrued rent and taxes, and dividend due on December 13th, 1913, and since paid	£23,737
(*b*)	Tramway cars at cost	110,497
(*c*)	Carts and motor vehicles, office furniture and fittings, horses, machinery, working plant, tools, and utensils—cost £10,733	6,762
(*d*)	Property at 1, South Charlotte Street, at cost	1,833
(*e*)	Stores on hand, including unexpired value of cables	46,553
(*f*)	Profits for four years, based on an average of six years, after deducting amount arranged to be spent on renewal of lines, capitalised and reduced to present value	92,026
(*g*)	Directors' fees for four years, capitalised and reduced to present value	7,434
(*h*)	Increased advertising rent, £750 per annum for four years	3,000
		£292,742

It was pointed out in a letter which the company sent to the Town Council that the directors have entered into a favourable contract for the supply of all cables up to the end of their lease, and they have stipulated that, in the event of the Corporation acquiring the tramways at an earlier date, they are to have the benefit of that contract. They have made a similar arrangement with the insurance company in which they are insured against third party and every other risk.

L.C.C. TRAMWAY MATTERS.

PROPOSED NEW TRAMWAYS.

At the meeting of the London County Council on Tuesday last the Parliamentary Committee reported that in accordance with the instructions of the Council they had prepared the London County Council (Tramways and Improvements) Bill, 1915. This contains proposals for the construction of about 2 miles 2 furlongs 3.3 chains of new tramways, of which about 5 furlongs 4.5 chains will be single, and 1 mile 4 furlongs and 8.8 chains double line; for the reconstruction for electric traction of certain existing tramways and for the execution of street improvements in connection with the proposed tramways and certain miscellaneous matters. The Council on November 10, 1914, resolved that no schemes for new tramways should be proceeded with in the session of 1915 to which the consent of the road authorities could not be obtained. The Council decided to put forward five schemes, and the consent of the road authority has been definitely refused to one of these, that from High Street, Shoreditch, to Cambridge Road, via Bethnal Green Road, consequently this scheme is not included in the bill. The proposals for the construction of new tramways are as follows:—

(1) Double line, 7.25 chains in length, commencing by a junction with the existing tramway in Farringdon Road at a point near Charles Street, and passing along Farringdon Road to a point near Charterhouse Street.

(2 and 2a) Double line, 4 furlongs 1.3 chains in length, from the present terminus at Aldgate to a point opposite the eastern side of Trinity Square via Mansell Street and Tower Hill, and thence a single line, 1 furlong 7.1 chains in length, along Tower Hill and the western, northern and eastern sides of Trinity Square.

(3 and 3a) 5 furlongs and 6.2 chains of double and 1.6 chains of single lines from Seven Sisters Road to near Crouch Hill Station, via Fonthill Road, Lennox Road and Stroud Green Road to Hanley Road, with a single loop line 1 furlong 6.3 chains in length in Crouch Hill, Japan Crescent and Mount Pleasant Road.

(4, 4a, 4b and 4c) 2 furlongs 4.1 chains of double and 1 furlong 9.5 chains of single line from Mare Street to Terrace Road and Church Crescent, via Well Street, Cassland Road and Lauriston Road.

This part also contains proposals for the reconstruction (1) of a small portion (3.5 chains) of the existing tramways in Whitechapel High Street in connection with tramways 2 and 2a; (2) of the existing tramways in Grange Road, Southwark Park Road, Raymouth Road and Rotherhithe New Road (1¾ miles in length).

The bill also contains provisions incorporating certain sections of the Council's Tramways Act for empowering the Council to run trailer and coupled cars on its tramways north of the River Thames.

EFFECT OF THE WAR.

Mr. J. D. Gilbert asked if the attention of the Highways Committee had been drawn to the crowded state of the cars running from the Embankment to South London districts between 5 and 7 o'clock p.m.; if the Committee would specially inquire as to increasing the number of the cars so that passengers could have reasonable travelling facilities at the time mentioned.

Mr. G. H. Hume (Chairman of the Committee) replied that he was fully aware of the facts mentioned, which he regretted. Even the present service was being maintained under great difficulty. A large number of tramway employees had responded to the country's call, and applications for permission to enlist were still being refused. Every effort was being made to teach men who were not qualified for driving to replace those who had joined.

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THE VALUATION OF BRISTOL TRAMWAYS.

Sir John Snell, who it will be remembered is advising the Bristol Corporation Tramways Option Committee, has sent a long letter to the town clerk on the differences between his estimates and those of Mr. Alfred Dickinson (as adviser to ratepayers opposing the Bill) regarding the valuation to be put on the Bristol tramway undertaking which the Corporation propose to buy from the company. Sir John Snell's valuation was £670,000, and that of Mr. Dickinson £1,215,000. In regard to Mr. Dickinson's statement that the price to be paid for the power station plant would be what it would cost to instal the identical original plant, Sir John Snell says that this statement is totally incorrect, as there would be a large deduction on account of depreciation. He examines various items, including tracks and cars, and maintains that Mr. Dickinson did not make due allowances for depreciation. Mr. Dickinson's valuation works out at £21,316 per mile of single track, while the actual capital expended on eight principal British tramway undertakings owning their own power stations averages £18,512 per mile of single track. Generally speaking the value of a tramway which is maintained in good running condition is between 60 and 65 per cent. of its replacement cost. Thus the above average figure of £18,512 would on the 65 per cent. basis be reduced to £12,032. Sir John's valuation of the Bristol lines works out at £12,800 per single track mile.

Under the usual experience in relation of award to replacement cost, Mr. Dickinson's £1,215,000 would represent a replacement cost of approximately £1,800,000 to £1,900,000, which is a good deal more than the capital expended as at December 31, 1913, by the Bristol Tramways and Carriage Company not only on their tramways, but also on the whole of their 'buses, cabs, and other matters.

The other chief error (the letter proceeds) in Mr. Dickinson's report is the tabular statement of receipts and expenditure, from which the deduction is made that the working expenses, including renewals, in four towns cited averages 7.524d. per car mile. That Sir John considers is an entirely misleading statement, as in the case of Glasgow enormous sums have been set aside for renewals. The average working expenses in the other three towns (Leeds, Newcastle, and Sheffield) including contributions to renewals funds is 6.98d. per car mile. This figure in the case of Bristol would mean a net profit on the revenue of 1913 of £20,305 after paying interest and sinking fund on Sir John Snell's valuation. Even if there were a large error in that valuation (which he absolutely denies) there is a wide margin in the net profits to cover any such error and entirely to reinsure the city against any possibility of a rate in aid.

MISCELLANEOUS NEWS AND NOTES.

Lowestoft cars are not to run on Christmas Day.

Carriage of Parcels at Birkenhead.—The Birkenhead Tramways Committee have decided to make a charge of one penny for each package weighing over 28 lbs. carried on the tramcars.

The Removal of Oxford's Tramway.—The disappearance of the tramway tracks in Oxford is now only a question of a comparatively short time, as the Highways Committee of the City Council have recommended their immediate removal. The cost of the work will amount to about £23,000, which is to be raised by a loan.

Tramway Men's Intercession Day.—The St. Mark's Tramway Brotherhood of the United Kingdom will on January 3 hold a day of intercession at St. Mark's Church, Kennington, London, when it is expected that there will be a great parade of tramway men. Bishop Boyd Carpenter will be the preacher, and he will dedicate a new badge of the Brotherhood.

The British Westinghouse Company have recently delivered a 5,000 kw. turbo-generator at the Frederick Road station of the Salford Corporation's electricity department. The new generator is a three-phase 50-cycle machine of the Westinghouse-Rateau impulse type working at 6,600 volts. A second unit of similar design and power will shortly be installed.

Accident on Wemyss Tramways.—A stoppage of the service on the Wemyss and District tramways occurred on December 7 from a curious cause. One of the poles carrying the overhead wires suddenly sunk into the ground, bringing down part of the overhead work. It is supposed that the pole dropped into the underground coal workings, the subsidence having been caused by the continued wet weather.

Electric Heaters and Radiators.—The Edison and Swan United Electric Light Company, Limited, have just issued a new catalogue of Ediswan heaters. Consequent upon the alteration in the cost of raw materials there has been a general revision of prices, but the list also embodies a number of additional appliances which are being introduced this season. The catalogue contains numerous illustrations of the various designs.

Sales Managers' Association.—Mr. H. Scholey will open a discussion on the position of the British electrical industry and methods of extension in the markets of the world at a meeting of the Sales Managers' Association, at the Holborn Restaurant on Thursday, December 17, at 8 p.m. A number of prominent electrical engineers are expected to be present. Those who desire to attend are invited to communicate with the Hon. Secretary of the Association at Sardinia House, Kingsway, W.C.

A New Motor Omnibus Service.—From next Monday the motor-'bus facilities between the City of London and Muswell Hill will be augmented by a new service, No. 43a, which will run daily, at intervals of ten minutes, from London Bridge to Colney Hatch Lane, via the Bank, Moorgate Street, Upper Street, Holloway Road, and Fortis Green Road, following the route taken by existing Service No. 43. Muswell Hill will thus have a five-minute service to the City via the route mentioned. On Sundays No. 43a will be extended to Friern Barnet.

The "Inside" of a Car.—At West London Police Court, on Tuesday, W. G. Fisher, a tramcar conductor, was summoned for allowing an excess number of passengers on his car. Previously in this case, the magistrate had held that the Board of Trade regulations permitting a certain number of excess passengers on a tramcar applied to the covered top deck of a car, as well as to the inside. The decision was reversed by a Divisional Court, and the case remitted by the judges. The magistrate now observed that the higher Court held that the inside of a tramcar was the lower deck only, and he must, therefore, bow to the superior wisdom of the judges. He imposed a nominal fine of 2s. 6d. with 2s. costs.

Tramway Risk Insurance in Aberdeen.—At a meeting of Aberdeen Town Council on Monday, the Tramways Committee recommended, in regard to claims against the department, that the practice of insuring in an insurance company be discontinued; that an account be opened and a sum placed annually to the credit of the account, with the view of a fund being created to meet any claims for compensation which might arise; that the sum of £700 be set apart this year for the purpose; that the sum to be set aside in future be fixed at 17s. 6d. per cent. per annum on the gross traffic receipts; and that the general manager be empowered to deal with and dispose of all claims which might be made. After a lengthy discussion the proposal was adopted by 22 votes to 11.

PERSONAL.

Mr. W. Phillips has been appointed European railway and steamship manager to the Canadian Northern Railway, in succession to Mr. Scott Griffin.

Councillor A. Sinclair has been elected chairman of the Swansea Electric Lighting and Tramways Committee for the thirteenth time. Alderman S. Colwill has been appointed vice-chairman.

Alderman John Tyrrell, High Sheriff of Belfast, has been appointed chairman of the Tramways and Electricity Committee of Belfast Corporation, in succession to Alderman Sir Robert Anderson, who has resigned.

Mr. Joseph L. White, traffic superintendent of the Lanarkshire Tramways Company, has been presented by the staff and employees with a silver tea and coffee service on the occasion of his marriage. Mr. G. F. Moller, general manager, made the presentation on behalf of the men.

Northampton Tramway Management.—The Town Council, acting on the recommendation of the Tramways Committee, have appointed Mr. J. F. Cameron as manager for six months on probation. Some objection was raised, as the appointment had not been advertised; but Councillor Beale, who seconded the proposal, said that Mr. Cameron was eminently suitable to the post, and to advertise would only delay matters.

CONTRACTS AND ORDERS.

British Thomson-Houston Company have an order for electric motors for Coplawhill car works, Glasgow. The same company have an order for a 1,500 kw. turbo-alternator for Blackpool Corporation.

Babcock and Wilcox, Ltd., have an order from West Bromwich Council for steel work and extensions to the boiler-house.

Durham, Churchill and Company, are to supply a 45 h.p. 3-ton motor chassis to Sheffield Tramways Committee at £650.

Walter Scott, Ltd., are supplying rails for tramway extensions for South Shields at £7 10s. per ton, plus 8s. per ton for royalty.

The Union Cable Company, Ltd., have an order for electric cables from Dewsbury Electricity and Tramways Committee.

The British Westinghouse Company have an order for 82 brake magnets and 32 skid-proof attachments from Rochdale Tramways Committee.

Bradford Electricity Committee have accepted the tender of the Sturtevant Engineering Company for an air filter for a 5,000 kw. turbo-alternator.

The Municipal Council of Sydney have placed an order with the Australian General Electric Company for three 2,000 k.v.a. transformers, at £5,097.

The British Thomson-Houston Company's tender for a duplicate set of turbines and condensing plant has been accepted by Torquay Town Council. The price of the turbines is £3,837 condensing plant, £1,247; and rotary converter, £1,163.

New Brakes for Sheffield.—The Spencer brake has now been in service on one of the Sheffield cars for the last fortnight, and Mr. A. R. Fearnley, the general manager, has recommended the purchase of nine of these brakes at £100 each from Cole, Marchent and Morley, Limited.

Glasgow Corporation Tramways.—Among the tenders recommended for acceptance by the Tramways Committee are the following:—Special track work, Titan Trackwork Company; scrap copper, P. and W. McLellan; armature coils and vulcanised cable, Shearer Brothers.

Coventry City Council have accepted the following tenders:—Turbo-alternator, British Thomson-Houston Company, Ltd., £10,810; four marine-type boilers, Babcock and Wilcox, Ltd., £11,166 8s.; four double-stokers, Bennis and Co., Ltd., £2,220;

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four economisers, Green and Son, Ltd., £3,524; bunkers, boiler-house framework, and coal and ash handling plant, Bennis and Co., Ltd., £11,016; induced draught plant, Babcock and Wilcox, Ltd., £3,595; pipework, Stewarts and Lloyds, Ltd., £2,480; cast-iron tank, Matterson and Co., Ltd., £360; cooling towers, Worthington Pump Co., Ltd., £3,260.

The Woods Gilbert Rail Cleaner Company, Limited, 2 and 3, Norfolk Street, Strand, London, W.C., are carrying out contracts for Cardiff Corporation tramways and the Isle of Thanet tramways, where the rails are being remodelled by their process. This consists in deepening the rail groove, smoothing the tread and joints and removing high checks. This is expected to increase the life of the rails about 50 per cent. The Woods Gilbert process was described and illustrated in our issue of October 16, 1913, when an account was given of the work which had been successfully carried out in Sydney, Melbourne, Brisbane and Ashton-under-Lyne.

CAPE ELECTRIC TRAMWAY COMPANY.

The report for the year ended June 30, 1914, shows a gross profit of £78,807, and after providing for debenture interest, redemption of debentures, and including the balance brought forward from last year, there is a credit balance of £32,618. From this sum £8,000 has been placed to the reserve fund, leaving a credit balance of £24,618. A comparison of the traffic results of the Cape Town Tramways for this and the previous year is as follows:—

	1914		1913		Inc.
Passengers carried	16,576,992	..	14,779,709	+	1,797,283
Total earnings	£155,472	..	£144,222	+	£11,250
Operating expenditure ..	86,284	..	77,859	+	8,425
Gross profit	69,188	..	66,363	+	2,825

The Port Elizabeth Tramways give the following results:—

	1914		1913		Inc. or Dec.
Passengers carried	4,309,154	..	4,155,711	+	153,443
Total earnings	£44,937	..	£43,036	+	£1,901
Operating expenditure ..	27,716	..	25,311	+	2,405
Gross profit	17,221	..	17,725	—	504

The directors remark that the labour troubles on the Rand, which resulted in a general strike in 1913, were followed by a recrudescence of the same troubles in January, 1914. They affected the general business situation throughout South Africa disadvantageously, and checked to a certain extent the otherwise satisfactory advance in the earnings of the tramways both in Cape Town and Port Elizabeth. In spite of this check, however, the receipts show satisfactory advances as indicated above, but owing to the increase in the cost of maintenance and operating charges, and to the income-tax lately imposed by the Union Government, the net profit is less than that of the preceding year. The additions to the rolling-stock and to the power plant at Port Elizabeth have now been completed. Owing to the disturbed financial outlook created by the war, the directors thought it prudent to recommend a dividend of only 2½ per cent., against 5 per cent. in the preceding year.

Mr. J. A. Barkley, general manager of the Cape Town Companies, reports that during the year a garage has been erected near the power station. Six new large double-deck cars, and two extra car bodies, have been received. An underground water storage tank, with a capacity of 32,500 gallons, was also built in order to ensure an adequate supply of water at all times. For the past few years the increased passenger traffic has necessitated the running of cars of large seating capacity from 40,000 to 45,000 miles per annum. This excessive mileage has interfered with the work of repairing the cars, but now that the new cars are in service the older ones are gradually being sent through the shops for overhauling.

Mr. W. H. Fremantle, general manager of the Port Elizabeth Tramway Company, Limited, reports that the new boilers and generating plant ordered at the commencement of the year were put in service on June 22, and promise to reduce considerably the coal consumption. The company no longer require to obtain power from the municipality. The new cars have also been received.

ARGENTINE TRANSANDINE RAILWAY COMPANY, LTD.

The 27th annual general meeting of the proprietors of this company was held at Winchester House, Old Broad Street, E.C., on Thursday, December 10, the Hon. Arthur Stanley, M.P. (chairman of the company), presiding. The Secretary (Mr. Arthur Rimmer) read the notice convening the meeting and the auditors' report.

The Chairman said that in dealing with the position as on June 30 last it would be convenient to refer in detail to such items of the report as called for remark. There was, unfortunately, a considerable decrease in the gross receipts for the year. The company's proportion, therefore, was consequently decreased from 30 per cent. to 29 1-5th per cent., with the result that they received in round figures only £28,063, as against £32,013 for the previous year, a decrease of £3,950, or 12.34 per cent. The decrease in the company's proportion was in accordance with the terms of the working agreement, and was only fair to the operating company who, under that agreement, had to meet all the costs of working which, on a mountain line, such as theirs, were heavy at the best of times, and in periods of storms, when the line was frequently blocked with snow, were much augmented. The financial year opened well, and up to October 4, 1913, they had an increase in the gross traffic of £12,270. Then came a scarcity of cattle, and a consequent increase in prices led to a practical suspension of the cattle business with Chile, which could not stand the increased price, in addition to the duty imposed by that country on Argentine cattle. The main sources of the company's traffic were passengers and cattle. Through and local passengers showed fair increases, but suburban passengers exhibited a large falling off, due probably to the bad state of the wine industry and to the establishment of a tramway service between Mendoza and Godoy Cruz. However, the loss in local passengers was compensated by the increase in receipts from through and suburban passengers, and the total passenger traffic showed on average a small increase. The second item—cattle—showed a very serious decrease—namely, £15,000, or over 70 per cent, but that result would doubtless have been mitigated but for the Chilian import duty on Argentine cattle. It was possible that the high price of meat in Chile might lead to the abrogation or suspension of that impost. Goods traffic gave an encouraging increase of over 53 per cent., but this item represented, so far, an inconsiderable proportion of the total receipts, and required time to develop. On the whole, apart from the cattle traffic, the result was not unsatisfactory, seeing that the line was blocked by heavy snow storms during the last month of the year under review. The storms occurred at intervals for several months, with the result that the through traffic had been practically suspended until the present time. Although their line was re-opened in November last, the Chilian side was still closed. It would be remembered that in 1906, when the receipts did not cover, nor show any immediate prospect of covering, the "B" debenture stock interest, the holders of that stock agreed to the permanent reduction of their interest from 6 per cent. to 4 per cent. in consideration of the payment at the latter rate for five years, out of any available funds of the company, at the same time agreeing to the suspension of that part of clause 5 of the conditions governing the issue of the "B" stock, which provided that interest thereon should become cumulative when it should have been paid for three consecutive years out of net earnings. That agreed period expired on June 30, 1911, and the cumulative right again came into force. An interim payment of 2 per cent. was made on January 1, 1914, and the balance of 2 per cent. to complete the year to June 30 last would be paid on January 1, 1915. As the interest thereby became cumulative, interest for the half-year to December 31 would also be paid at the time time. It would be observed that there was available a sum of £18,233 13s. 7d. Of that amount only the small balance of £1,177 1s. 2d. was contributed by the financial year now under review. Turning to the accounts, there were one or two points upon which the shareholders might desire some explanation. In the balance sheet it would be noticed that there was a temporary issue of £93,000 "B" debenture stock, against which there was a loan of £41,500. That figure did not constitute the whole of the amount, which was secured on the £93,000, as they had the right to increase the loan to £60,000 on the same security. In conclusion he moved the adoption of the report and accounts.—Mr. Vivian H. Quintle seconded the motion, which after a short discussion was adopted.—The retiring director and auditors were re-elected, and the proceedings terminated with a vote of thanks to the chairman and directors.

FINANCIAL REPORTS AND MEETINGS.

New South Wales Tramways.—The report for the quarter ended September 30 last shows that the earnings were £480,447, being an increase of £50,433, and the working expenses were £407,628, an increase of £20,748. The length of line open is 215 miles.

United Electric Tramways of Montevideo.—The directors of the United Electric Tramways of Montevideo, Limited, announce an interim dividend at the rate of 4 per cent. per annum (2s. per share), less income-tax, on the ordinary shares for the past half-year.

Erith Tramways.—The annual report on the electricity and tramway undertakings, which has been submitted to the Erith Council by Mr. A. Coveney, states that the last extension of the generating station resulted in marked economies. With the continual steady growth and output of the station it must be obvious that the question of future extension cannot be postponed. The London County Council's proposals to seek Parliamentary powers in regard to bulk supply may have the effect of influencing the Committee as to incurring additional expenditure on the undertaking. Whilst Mr. Coveney is not satisfied that the Bill will pass through Parliament in its present form, he thinks it is within the range of possibility that some compromise may be arrived at which will have the effect of minimising the opposition, and perhaps in five to ten years' time the bulk supply may be available, but if this part of the Council's business is to proceed, they cannot hold up the question of extension pending the advent of a bulk supply. On the tramways the gross profit was £4,644 (increase £489). The increase in revenue was £1,916, and in working expenses £1,427. The net deficiency was £1,672 (compared with £2,142), an improvement of £470, although there was a large increase in cost of repairs to permanent way, and cars, and in wages of motormen and conductors.

A. Darracq and Co. (1905).—The accounts show a credit balance on trading account for the year of £93,024, after making provision

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(Continued from page 436.)

COUNTY BOROUGH OF HUDDERSFIELD.

The Highways Committee of the Huddersfield Corporation are prepared to receive tenders for the supply of a Motor-Driven Street-Sweeping Machine with Collecting Van attached, capable of negotiating gradients of 1 in 8.

Tenders, accompanied by specification and illustration, to be delivered at this office not later than Monday, January 4, 1915.

K. F. CAMPBELL, M.Inst.C.E.,
Borough Engineer and Surveyor.

Borough Engineer and Surveyor's Office, Huddersfield,
November 27, 1914.

POSITIONS VACANT.

COUNTY BOROUGH OF WALSALL.

ELECTRIC SUPPLY DEPARTMENT.

MAINS ENGINEER.

The Electricity Committee invite applications for the position of Mains Engineer.

Applicants must have had first-class experience in the following :—

(*a*) Drawing Office.
(*b*) The Laying and Maintenance of E.H.T. and L.T. Feeder and Distributor Mains and Services.
(*c*) Inspection and Testing of Consumers' Installations.
(*d*) Organisation and Control of Department.

The salary will be £4 per week, and applications stating age, technical training, and giving full particulars of qualifications, together with copies of three testimonials, are to be sent to the undersigned not later than December 18.

H. A. HOWIE,
Engineer and Manager.

Wolverhampton Street, Walsall,
December 10, 1914.

COUNTY BOROUGH OF ECCLES.

SHIFT ENGINEERS.

The Corporation of Eccles require immediately two temporary Shift Engineers (to fill war vacancies) at their Electricity Works. Wages 35s. per week. Applicants preferably to have held similar positions in a generating station supplying H.T. single-phase alternating current for lighting and general power purposes, and also direct current for traction purposes. Applications endorsed "Shift Engineer," stating age, experience, and when able to commence duty, accompanied by copies of not more than three recent testimonials, to be forwarded at once to the BOROUGH ELECTRICAL ENGINEER, Electricity Works, Cawdor Street, Patricroft.

COUNTY BOROUGH OF NEWPORT.

ELECTRICITY DEPARTMENT.

The Newport Corporation require the services of a Switchboard Attendant. Salary, 30s. per week.

Applications, stating experience, should be sent in at once addressed to the undersigned.

A. NICHOLS MOORE, M.I.E.E.,
Borough Electrical Engineer.

Town Hall, Newport, Mon.,
December 9, 1914.

GENERATING ENGINEER.

Wanted, for an Electric Supply Undertaking, a well-qualified skilled, and experienced working

Mechanical and Electrical Engineer

to take charge of the operation and maintenance of a 4,000 kilowatt generating station equipped with water-tube boilers, mechanical stokers, condensers, three-phase turbo-generators and direct current steam dynamos, batteries, extra-high pressure and low-pressure switchgear, rotary converters, etc. Applicants having a first-class Board of Trade certificate and a good record for low generating costs and efficient maintenance will have preferential consideration. A good salary will be payable to a first-class man. Applications, stating age, whether married, with full particulars of qualifications and experience, length of notice required, and salary desired, to be made by letter to Messrs. MAY AND HAWES, Consulting Engineers, Caxton House, Westminster, not later than December 21, 1914.

YORKSHIRE (WEST RIDING) ELECTRIC TRAMWAYS COMPANY, LTD.

Wanted Traffic Superintendent for Wakefield Section. Apply, giving full particulars of experience, salary required, etc., to H. ENGLAND, Belle Isle, Wakefield.

for bad and doubtful debts. The addition to this amount of interest and transfer fees gives a total of £100,737. After writing off depreciation, etc., and all general charges, there remains a net profit of £64,461. This, plus the sum brought forward, makes a total of £72,100. The directors propose that the half-year's dividend on the preferred ordinary shares due October 1 last be paid, and that the balance of £17,725 be carried forward to next year's account.

Lancaster and District Tramways Company.—At the annual meeting in Lancaster on November 28, Mr. A. Bell, who presided, said that the receipts, which amounted to £5,495, showed a decrease of £1,027. They had been able to reduce the expenditure by £744. Down to the beginning of August they were doing extremely well, but when the war broke out the result on their receipts was disastrous. On September 18 the War Office took over their motor omnibuses on fair terms, but within a few days they would have the delivery of new omnibuses and would re-start the service as soon as possible. The report was adopted.

Dennis Brothers (1913) Limited.—At the annual meeting of this company held on November 23, Mr. N. P. Andrew, who presided, said the profit reached £61,484, an increase over last year of £18,235. This was due to normal, though largely increased sales, effected at a reasonable profit. The profit was reasonable because they had to meet keen competition. Some had expressed the view that the present military demand would lead many touring-car manufacturers to enter the vehicle trade. It would not be easy for such manufacturers to make the transition. When the war broke out they had orders sufficient to keep the works going for several months. However, their factory was a valuable asset to the Government just now, and patriotism demanded that the company should give the Government the largest possible output. The report was adopted.

Railways in Rhodesia.—The report of the British South Africa Company for the years ended March 31, 1913, and March 31, 1914, which was issued on Wednesday, contains some interesting particulars of the development of railways in the territory with which the company is associated. The approximate net receipts of the Rhodesia and Mashonaland Railways for the year ended September 30 last were £861,855, as compared with £921,100 in the previous year, and £815,632 in 1912. The figure for 1910 was only £642,683. For 1913 the receipts were swollen by large importations of machinery and other material required by mines in Southern Rhodesia. During the later years substantial reductions in rates and fares have been made. The improvement of the system and plant has been steadily continued. Many of the curves have been reduced, the road-bed has been strengthened, new sheds and other facilities for the handling of traffic have been erected, and further locomotives and rolling stock have been provided. The benefits of this policy are now being shown in reduced running costs. Various extensions have been opened during the last two years.

Adelaide Municipal Tramways Trust.—We have received from Mr. W. G. T. Goodman, chief engineer and general manager of the Municipal Tramways Trust, of Adelaide, his report on the progress of the undertaking during the two years from August 1, 1912, to July 31, 1914. At the latter date the total route length of the tramways was 51.8 miles, amounting to 92.6 miles of single track. The area served is approximately 28 square miles. The following is a summary of the revenue account for the two years:—

Year ended.	Total receipts.	Total expenses.	Net balance.	Ratio of working expenses to receipts.
July 31, 1913 ...	£310,240 ...	£207,919 ...	£102,321 ...	66·825
July 31, 1914 ...	328,810 ...	202,503 ...	125,305 ...	61·587

The number of passengers carried during the year ended July 31, 1914, was 43,797,227, and the traffic receipts were £323,500. The receipts averaged 14.63d. per mile. The total revenue per car mile was 14.817d., compared with 14.484d. in the previous year. The average fare per passenger was 1.78d. The revenue per mile of single track open was £3,618, compared with £3,471. The excess of total revenue over total working expenses per mile of single track open was £1,412, against £1,166. The working expenses per car mile were 9.126d., against 9.679d. At the power station the total kilowat hours generated during the year ended july 31 last was 12,419,647, against 11,657,628 in the previous year. The total amount spent on construction work to July 31 last was £1,359,013 During the two years £36,878 was added to the reserve for renewals, this sum being equivalent to 2½ per cent. on the capital cost of the renewable parts of the lines already opened, plus interest. The total reserve for renewals now amounts to £67,686. In December, 1912, an Act was passed to enable the Corporation of Port Adelaide to join in the scheme of municipal tramways authorised by the Municipal Tramways Trust Act, 1906; it provides for the Corporation of Port Adelaide to be a suburban corporation with the same liabilities and rights as the suburban corporations mentioned in the principal Act. In view of this an agreement has been arrived at for the purchase of the existing horse tramways in Port Adelaide and its vicinity. Plans for the construction of a system of electric tramways in Port Adelaide and its vicinity are in preparation, and a large amount of materials for the construction of the tramways has been delivered.

British Columbia Electric Railway Company.—In their report for the year ended June 30, 1914, the directors state that the result is not as satisfactory as those to which the shareholders have been accustomed in the past. In order to maintain the usual dividend it is necessary to supplement the profits by the transfer of £10,000 from the reserve. This course has been recommended with some hesitation by the directors in view of the unfavourable outlook for

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the current year caused by the war, but they wish to avoid throwing any additional hardship on the shareholders at the present time and for that reason propose to draw on the reserve. The sum of £152,377 has been charged against the revenue account for the year, and the net profit remaining is £393,956. To this is added the £10,000 from reserve and £9,519 brought in, making £413,475. It is proposed to pay a final dividend of 4 per cent. on the deferred stock, making 8 per cent. for the year, and to carry forward £6,884. The income for the year was £410,229, against £401,836 in 1913, and the balance available for dividend was £260,905, against £256,242. Owing to the depression the large employers of labour in British Columbia have been forced to postpone all new work, and as a result there has been a decrease in the population of Vancouver and the neighbouring districts of approximately 20,000 inhabitants. The financial effect of this decrease would have been more marked but for a small advance in fares put in force in September, 1913. The expenditure on capital account has been reduced to a minimum. The directors announce with regret that Mr. Buntzen, who retires from the board, has decided not to seek re-election owing to his continued residence in Denmark. He has, however, consented to accept the position of adviser to the board. During the first eight years of the company's existence Mr. Buntzen was general manager in British Columbia, and the company owe him a debt of gratitude for his close attention to its affairs. The board has appointed Mr. George Kidd to succeed Mr. Sperling as general manager. Mr. Kidd was formerly secretary and recently controller of the company, and the board have confidence that they have secured a very capable successor to Mr. Sperling.

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 57 of the principal undertakings of the United Kingdom for the week ended December 5 give total receipts of £209,035, or £1,778 more than in the corresponding week last year. The total length of track was 2,630 miles, or 24 more than for the corresponding week. The receipts this year were at the rate of £79 16s. 5d. per mile of track, and last year at the rate of £79 17s. 6d., thus giving a decrease for the past week of 1s. 1d. per mile open.

Coal Market.—Owing to the difficulties of navigation and scarcity of supplies in consequence of the demand of the Allied Admiralties, quotations can now be given only at time of actual delivery.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return.		Aggregate		
		1912-3.	1913-4.	Wks.	1913-4.	Increase or Dec.
Anglo-Argentine	Dec. 2	£58,390	£52,716	48	£2,584,218	— £79 131
Auckland..... (28 days)	Nov. 20	10,497	19,391	20½	104,518	+ 12,264
Ballarat and Bendigo	Oct. 11	3 629	3,312	28	23 934	— 583
Brazilian St. Rly. Mlrs	May	44,820	50,237	43	523,872	+ 76,626
Brazilian Trctn. Mlrs.	Oc ober	6,098,850	6,241,170	43	61,411,258	+ 1,488,593
Brisbane	Nov.	27,053	28,606	47	317,221	+ 30,150
British Columbia .... $	October	753,501	661,000	17	2,676,351	— 338,004
Buenos Aires Pt. & City	June	6,791	6,733	26	43,250	+ 3,143
Buenos Aires Lacroze	July	45,221	43,327	4	43,327	— 1,894
Calcutta.....Rs.	Dec. 5	68,560	63,057	48	32,03,740	+ 26,166
Cape Town	October	12,223	12,682	17	49,456	+ 2,953
Carthagena & Herrerias	Nov.	1,922	1,379	47	24,067	— 4,098
Cordoba	October	13,278	12,919	30	94,886	+ 883
East India	Nov.	1,922	2,029	17	8,128	+ 295
Kalgoorlie	Sept.	3,068	2,864	38	23,980	— 2,467
La Plata	Nov.	5,409	4,540	47	50,933	— 4,907
Lima	Sept.	34,177	28,786	43	300,472	— 210
Lisbon ..... Mlrs.	July	164,715	171,179	31	1,143,064	+ 45,838
Madras (14 days) Rs.	Nov. 30	25,530	24,558	47	6,10,734	+ 24,421
Manila .....$	October	148,000	125,750	43	1,341,070	— 48,025
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	Sept.	61,969	58,664	39	556,346	+ 25,393
Mexico .....$	October	616,007	558,990	43	6,072,755	+ 340,417
Montevideo	Nov	30,531	27,081	4	27,081	— 3 450
Port Elizabeth	October	3,553	3,372	17	12,522	— 538
Puebla ..... $	October	68,000	49,100	43	583,600	+ 4,900
Rangoon	Nov.	5 686	4,405	47	55,062	— 2,223
Shanghai .....$	Oct. 28	24,307	22,885	...	...	...
Singapore .....$	Oct. 31	11,265	9,758	...	497,159	— 28,595
Toronto .....$	Octo'er	861,235	849,636	43	8 471,743	+ 427,038
Winnipeg..... $	October	357,318	330,562	43	3 402,502	+ 63,754

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return.			Aggregate.		
		1913-	1914.	Incr. or Dec.	Wks.	1913-4.	Increase or Dec.
Aberdeen Corporation..	Dec. 2	£1,558	£1,551	— £7	27	£45,251	+ £723
Accrington Corp.....	Nov. 25	569	416	— 153	34	18,717	— 1,132
Ayr Corporation	Dec. 5	239	227	— 12	29	11,493	— 983
Bath Electric	,, 2	748	705	— 43	48	46,215	— 25
Birkenhead Corp.	,, 6	1,206	1,251	+ 45	35½	45,183	— 1,575
Birmingham Corp.	,, 5	12,595	12,386	— 209	36	434,477	+ 10,662
Blackburn Corporation	,, 2	1,172	1,048	— 124	36	46,901	— 809
Blackpool Corporation	,, 3	644	666	+ 22	36	64,726	— 2,881
Bolton Corporation	,, 6	2,581	2,396	— 185	36	87,967	— 990
Bournemouth Corp.....	,, 9	1,616	1 643	+ 27	36	74,719	— 3 941
Bradford Corporation..	,, 5	5 586	5,538	— 48	36	223,235	+ 8,929
Brighton Corporation.	,, 6	829	833	+ 4	36½	40,975	— 450
Bristol	,, 4	7,517	8,460	+ 943	48½	413,984	+ 24,159
British Elec. Federatn.	*	...	...	...	...	...	...
Burnley Corporation ..	Dec. 5	1,566	1,336	— 230	36	55,520	— 6,207
Burton-on-Trent Corp.	,, 6	280	286	+ 6	36	10,771	+ 243
Bury Corporation.....	,, 6	1,290	1,128	— 162	35½	49,360	+ 228
Cardiff Corporation.....	Nov. 28	2,619	2,342	— 277	34	96,453	+ 18
Chatham and District..	Dec. 3	867	974	+ 107	48	46,425	+ 1,634
Chesterfield Corp.	,, 3	257	256	— 1	35	9,568	+ 311
Colne Corporation	,, 5	251	194	— 57	...	...	...
Cork Electric.....	,, 3	480	450	— 30	48	24,064	— 142
Croydon Corporation ..	Nov. 27	1,508	1,445	— 63	34	59,628	+ 1,996
Darlington Corporation	Dec. 5	238	257	+ 19	36	9 510	+ 502
Derby Corporation	,, 5	923	910	— 13	35½	35,387	+ 720
Dover Corporation	,, 5	180	220	+ 40	36	9,275	+ 1
Dublin & Lucan	,, 4	120	121	+ 1	22½	3,306	— 29
Dublin United	,, 4	4,955	5,718	+ 763	48	283,266	+ 18,730
Dundee City	,, 2	1,306	1,223	— 83	28½	37,301	— 706
East Ham Corporation	,, 5	1,037	1,221	+ 184	35½	42,183	+ 5,859
Exeter Corporation	,, 4	304	318	+ 14	36	12,842	+ 209
Fearless Motor 'Buses.	*	...	...	...	...	...	...
Glasgow Corporation ..	Dec. 5	20,759	19,904	— 855	26	543,836	— 612
Glossop (U. Elec. Supply)	,, 5	116	93	— 23	49	5,884	— 450
Halifax Corporation ..	,, 1	1,960	1,942	— 18	35	78,528	+ 2,768
Hastings & District.....	,, 2	751	683	— 68	49	48,739	— 3,096
Huddersfield Corp.	,, 5	2,020	2,294	+ 274	36	104,648	+ 8,342
Hull Corporation	,, 5	3,201	3,001	— 200	36	111,601	— 1,587
Ilford U.D.C.	,, 5	463	587	+ 124	35	20,359	+ 4,067
Ilkeston Corporation ..	,, 9	121	113	— 8	36	4,715	— 229
Ipswich Corporation ..	,, 5	375	383	+ 8	36	16,713	— 276
Isle of Thanet	,, 5	290	262	— 28	9	3,302	— 514
Kilmarnock Corp.	,, 3	165	148	— 17	29	4,777	— 490
Lanarkshire	,, 3	1,821	1,651	— 170	48	89,782	+ 6,843
Lancashire United	,, 2	1,610	1,469	— 141	48	78 361	+ 3,300
Leeds City	,, 5	8,070	7,919	— 151	36	296,850	— 273
Leicester Corporation..	,, 5	2,771	2,785	+ 14	49	138,906	+ 2,229
Leith Corporation	,, 5	646	648	+ 2	29	21,255	+ 200
Leyton U.D.C.	,, 3	1,337	1,377	+ 40	34	48,372	+ 2,094
Liverpool Corporation..	,, 5	12 881	12,642	— 239	48½	635,697	+ 8,016
Llandudno & Colwyn B.	Nov. 27	154	143	— 11	52	15 616	— 2,057
London County Council	Dec. 2	42,479	45,553	+ 3,074	35	1,559,061	— 74,408
London Gnl. Omnibus..	*	...	...	...	...	...	...
London United	*	...	...	...	...	...	...
Lowestoft Corporation	Nov. 28	171	161	— 10	8	1,530	— 163
Maidstone Corporation	Dec. 3	188	160	— 28	36	7,661	+ 129
Manchester Corp.....	,, 5	17.363	16,351	— 1,012	36	620,170	— 11,235
Met. Elec. Trys.	*	...	...	...	...	...	...
Nat. Steam Car Co., Ld.	Dec. 7	3,580	3,424	— 156	5	18,609	— 814
Nelson Corporation.....	,, 5	183	150	— 33	35½	6,758	— 876
N'castle-on-Tyne Corp.	,, 5	4,941	5,814	+ 873	36	196,051	+ 20,127
Newport (Mon.) Corp..	,, 5	760	743	— 17	36	29,496	+ 1,675
New St Helens & Dist..	,, 2	777	810	+ 33	22	21,158	+ 1,899
Northampton Corp	,, 4	536	609	+ 73	35½	21,335	+ 396
Nottingham Corp.	,, 3	3,311	3,180	— 131	35½	120.795	+ 769
Oldham Corporation ..	,, 6	2,132	1,915	— 217	37	80,937	— 1,104
Portsmouth Corp.....	,, 5	1,919	2,042	+ 123	36	87 878	...
Preston Corporation ..	,, 2	852	851	— 1	36	32,967	+ 876
Provincial	,, 5	1,644	1,873	+ 229	9½	18,418	+ 2,484
Reading Corporation ..	,, 3	653	654	+ 1	35	25 235	+ 316
Rhondda.....	Nov. 26	1,549	1,398	— 189	47	57 947	+ 903
Rochdale Corporation	Dec. 5	1,457	1,401	— 56	36	58,474	+ 163
Rotherham Corp.....	,, 9	958	945	— 13	36	37 366	+ 915
Salford Corporation ..	,, 7	5,142	4,781	— 361	35	180,419	— 8,578
Sheffield Corporation..	,, 6	7,465	7,676	+ 191	36½	282,443	+ 6,716
Southampton Corp.....	,, 2	1,233	1,209	— 24	35	47,532	— 349
Southend-on-Sea Corp.	,, 2	674	624	— 50	33	38,054	+ 2,150
South Met. Trys.	*	...	...	...	...	...	...
South Shields Corp.....	Dec. 5	663	696	+ 33	35½	27,561	+ 1,614
Sunderland Corp.....	,, 6	1,332	1,357	+ 25	36	53,363	+ 916
Sunderland District ..	,, 2	675	619	— 56	6	2,554	— 265
Swindon Corporation ..	,, 2	153	171	+ 18	35	6,372	+ 433
Torquay	Nov. 26	462	222	— 77	47	26,444	— 3,720
Trys. (M.E.T.) 'Buses	*	...	...	...	...	...	...
TynesideTrys. & Tmrds	Dec. 2	470	515	+ 45	23	14,047	+ 2,042
Wallasey Corporation	,, 5	1,098	1,073	— 25	35½	45,906	+ 1,128
Walsall Corporation ..	,, 5	628	673	+ 45	49	30,702	+ 191
Walthamstow U.D.C...	,, 5	701	726	+ 25	36	29,486	+ 2,534
Warrington Corp	Nov. 26	457	394	— 63	34	14,975	— 417
West Ham Corporation	Dec. 3	2.695	2.721	+ 26	35	100 335	+ 3,566
Wigan Corporation	,, 3	1.516	1.398	— 118	36	51.584	— 1.530
Wolverhampton Corp	,, 9	1,045	1,006	— 39	37	38,335	— 1,219
Yorkshire (W. Riding)	,, 6	1,333	1,316	— 17	49	70,910	— 44

* Issue of Traffic Returns suspended during the War.

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THE

Tramway & Railway World

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NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Wednesday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Monday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."

Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

COUNTY BOROUGH OF BIRKENHEAD.

BIRKENHEAD CORPORATION ELECTRICITY SUPPLY.

The Corporation of Birkenhead invite tenders for the supply of Electric Motors and Motor Starters from ¼ to 15 h.p. which may be required during the twelve months ending December 31, 1915.

Copies of the specifications, with forms of tender and general conditions, can be obtained on application to the Borough Electrical Engineer, Mr. G. P. Shallcross, Corporation Electricity Works, Craven Street, Birkenhead, on the payment of a fee of £1 1s., which will be returned on receipt by the Corporation of a *bonâ-fide* tender.

Tenders, which must be on the printed form supplied, sealed and endorsed "Tender for Electric Motors and Motor Starters, Electricity Department," must be sent in to me not later than 9 a.m. on Tuesday, January 12, 1915.

Parties whose tenders may be accepted will be required to enter into a contract containing a clause as to the payment of the rate of wages, and the observance of the hours of labour and conditions recognised and agreed upon between the trades unions and the employers in Birkenhead, or in the locality in which the work for carrying out the contract is executed, as the case may be.

The Corporation do not bind themselves to accept the lowest or any tender, and reserve to themselves the right of accepting the whole or any portion of a tender.

By order, J. FEARNLEY,
Town Clerk.

Town Hall, Birkenhead,
December, 1914.

BURGH OF AYR.

Tenders are invited for the supply of Uniforms for Tramway Inspectors, Motormen and Conductors. Forms of tender and particulars may be obtained on application to Mr. W. Grant, A.M.I.E.E., Tramway Manager, Town Buildings, Ayr. Sealed tenders, endorsed "Tramway Uniforms," with separate sample of cloth marked with a private mark, which shall not be recognisable until the tenders are opened, must be delivered to the undersigned not later than Thursday, December 24, 1914. The lowest or any tender may not necessarily be accepted.

P. A. THOMSON,
Town Clerk.

Town Hall, Ayr.

COUNTY BOROUGH OF STOCKPORT.

The Tramways Committee of the Stockport Corporation invite tenders for the supply of twenty-five pairs of points and twenty-five crossings of solid manganese steel.

Tender forms and specifications can be obtained on application to the undersigned.

A. T. EARDLEY,
Tramways Manager.

Stockport, December 16, 1914.

BOROUGH OF HORNSEY.

The Town Council invite tenders for the supply, delivery, and complete erection of Extra-high Tension Switchgear, and also for the supply and delivery of Extra High Tension Three-core Cable.

Forms of tender may, after 10s. 6d. has been deposited with the Borough Treasurer in respect of each or either of the above tenders (to be refunded to *bona-fide* tenderers after tenders have been considered), be obtained of the Borough Electrical Engineer, at the Electricity Works, Tottenham Lane, Hornsey, N.

Tenders, endorsed "Tenders for E.H.T. Switchgear" or "Tenders for E.H.T. 3-Core Cable," to be delivered or sent by post, so as to be received in the Town Clerk's office by 12 (noon) on Tuesday, the 29th inst.

The Council reserve to themselves the right to decline all, or any, or any portion of any, of the tenders sent in.

F. D. ASKEY,
Town Clerk.

Town Clerk's Office, Town Hall,
99, Southwood Lane, Highgate, N.,
December 1, 1914.

HONG KONG ELECTRIC COMPANY, LTD.

Messrs. Preece, Cardew and Snell are instructed to invite tenders for the following Plant and Cables required for the North Point Generating Station in Hong Kong.

No. 1. Two 1,500 k.w. (2,000 k.v.a.) turbo-alternators with condensing plant and switchboards.
No. 2. Extra high tension cable.
No. 3. Substation switchboards and transformers.

Specifications, general conditions and forms of tender may be obtained from Messrs. Preece, Cardew and Snell, 8, Queen Anne's Gate, Westminster, S.W., on payment of a deposit of £1 for each section (two copies), which sum will be refunded on receipt of a *bonâ-fide* tender. Extra copies of each specification can be obtained on payment of 2s. 6d. each (non-returnable).

Sealed tenders, in duplicate, endorsed "Hong Kong," to be delivered to Messrs. Preece, Cardew and Snell, 8, Queen Anne's Gate, Westminster, S.W., on or before noon on Friday, January 15, 1915.

POSITIONS VACANT.

COUNTY BOROUGH OF BOLTON.

ELECTRICITY DEPARTMENT.

Applications are invited from suitable men for the following temporary positions.

One Charge Engineer at 50s. per week.
Two Junior Engineers at 30s. per week.
Four Switchboard Attendants at 25s. per week.

Applicants must have had previous experience in three-phase and D.C. work, and must be men not eligible for service with H.M. Forces.

Applications, stating age and qualifications, and enclosing copies of not more than three recent testimonials, to be forwarded to Mr. W. J. H. Wood, Borough Electrical Engineer, Electricity Works, Spa Road, Bolton.

COVENTRY CORPORATION TRAMWAYS.

Fitter for Tramcar Repairs, also General Assistant in car shed, wanted. Apply in writing to the General Manager, Priestley's Bridge Depôt, Coventry, stating age, experience, wages required, and furnish copies of two recent testimonials.

INSPECTORS.

Wanted, Smart Inspectors for Motor Omnibus work. Wages 35s. per week. State experience, age, whether married, to Maidstone and District Motor Services, Ltd., Maidstone, Kent.

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TRAMWAY INSPECTORS.

Tramway Inspectors wanted for large system. Wages commencing 32s. 6d. per week, rising to 37s. 6d. Apply with full particulars of experience, state age, and enclose copies of testimonials, to Box 118, THE TRAMWAY AND RAILWAY WORLD, Amberley House, Norfolk Street, London, W.C.

FOR SALE.

SINGLE DECK CARS FOR DISPOSAL.

Sheffield Corporation Tramways have Four Single-Deck Cars in good running order for immediate disposal at a nominal price, in consequence of their being displaced by Double-Deck Cars.

Further particulars may be obtained from

A. R. FEARNLEY,
General Manager.

Division Street, Sheffield,
December 17, 1914.

READING CASES
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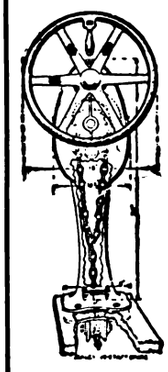

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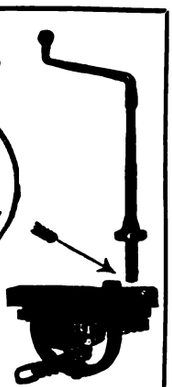

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THE
Tramway AND Railway World

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SATURDAY, DECEMBER 19, 1914.

THE LONDON TRAMWAY STOPPAGE.

The complete stoppage of traffic on London County Council Tramways, which began soon after five o'clock in the evening of Friday, December 11, and continued till the following day, was the most serious interruption which has ever occurred to the working of this system. A very partial service of cars was given on Saturday afternoon, and a fuller service on Sunday, but it was not till Monday that what may be called approximately a regular service was resumed. It is gratifying to observe from the official explanations, which are given in another column, that the accident, which took place in the Greenwich power station and caused all the trouble, occurred in exceptional circumstances and that these circumstances really led to the stoppage. The announcement was made that a transformer-box burst, and the oil which was scattered from it set fire to some adjoining wooden staging which had been erected in connection with the alterations and extensions now going on in the station. The fire burned the insulation of the cables leading from the generators to the switchboard, and the whole station shut down. The transformer, which was one for producing low tension current for the instruments, had been in use for about ten years, and it would have been done away with in another five days. The protective devices recently adopted were effective in preventing damage to the generators from the heavy electric surges set up in the system when the cable insulation gave way. Two slow-speed generators suffered, but these are coupled to the reciprocating engines which are about to be superseded by turbines, and consequently were not fitted with the protective devices. Thus it is claimed that the general stoppage would not have taken place but for the presence of the temporary wood staging. The "explosion" in the transformer-box may have been caused by insulation of the coils giving way. It is significant, however, that the first shut-down which occurred a few years ago in the case of the Chelsea generating station was also brought about by the failure of a small instrument transformer. The County Council have been unfortunate in the case of this accident, but it is satisfactory to learn that there are now no old transformers in the station—the one which has now gone being the last of the original lot. As to the future, it appears that the protective devices will be effective in the case of a heavy short-circuit to prevent the spread of trouble in the generators. As a further precaution, it has been suggested that the Greenwich station should be permanently connected by high-tension cables with other power stations, so that an emergency supply may be at once obtainable. At present the other greatest generating station in London devoted purely to traction work, and having a large reserve of power, is that at Chelsea, which supplies so many of the underground railways. Unfortunately, however, the periodicity of the high-tension three-phase current produced at Greenwich is 25 cycles per second, while that generated at Chelsea has a frequency of 33⅓ cycles. The machinery in the tramway sub-stations thus could not deal with current from Chelsea, and conversely the current from Greenwich would not suit the railway sub-stations. The scheme would thus involve, besides the cost of laying miles of cables, the provision of motor-generators at Greenwich or Chelsea (or both), or of some other frequency-changing devices capable of dealing with large powers. This machinery would, of course, be expensive, it would be very rarely required, and when needed it would only be for a short time. It is a question for all concerned whether the risks of stoppage, which are being more and more eliminated, are such as to make such expenditure advisable. Meanwhile, it is apparent that some energy in suitable form is obtainable on emergency from a number of other and for the most part smaller stations.

DARKER LONDON.

REAR LIGHTS COMPULSORY.

The Secretary of State's Order for the Metropolitan Police District and the City of London, which was about to expire at the end of the month unless renewed, has been superseded by a fresh Order. This differs from the previous Order in two particulars only:—

1. The use of any lights whatever for outside advertising or for the illumination of shop fronts is now prohibited. Formerly only "powerful" lights were prohibited, and the uncertainty as to what lights were "powerful" led to evasions of the Order.
2. An entirely new provision is inserted requiring all vehicles to carry, in addition to any head lights which the existing law requires, a lamp which shows a red light to the rear. Experience has shown that this is necessary in the present condition of the streets to protect vehicles from being run into from behind.

It should be particularly noted that this requirement extends to cycles and handcarts as well as to other vehicles. The red glass "reflectors" which are so largely used by cyclists are no longer sufficient, but a lighted lamp must be carried which shows red to the rear.

It may be hoped that this requirement of rear lights on all vehicles will be made permanent and of universal application throughout the country. It is particularly important from the standpoint of suburban and inter-urban tramways, and has often been urged as a necessary precaution.

New Turbo-Alternator at Liverpool.—The latest addition to the plant at Lister Drive Station, Liverpool, is a 7,500 k.v.a. turbo-alternator, manufactured by the British Thomson-Houston Company, which was formally started on Friday evening of last week. The Lord Mayor and a party of guests visited the station and afterwards dined at the Midland Adelphi Hotel, under the chairmanship of Mr. Russell-Taylor, who, in proposing the toast of the Lord Mayor, said that the idea of the night inspection was his own. They now had a generating plant of a total capacity of 17,000 kilowatts and another machine with a capacity of 6,000 k.w. was under construction. Alderman Fred Smith, in proposing the toast of the Electrical Engineer, said they all recognised Mr. Harold Dickinson's capacity and appreciated his services to the Electricity and Tramways Committee. Mr. Dickinson, in replying, alluded to the services of Mr. Bromley Holmes, who, he said, designed the buildings in Lister Drive in such a way that they had been able, without adding to them, to increase the capacity with modern plant.

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SERIOUS STOPPAGE OF LONDON TRAMWAYS.

On Friday evening, December 11, the whole tramway system of the London County Council, with the exception of a short section in the East End, which is separately supplied with energy, came to a standstill. The stoppage occurred just after 5 o'clock, so that the inconvenience was very great. The traffic was not resumed till Saturday, and then only to a very limited extent. Neither could the Saturday afternoon traffic be dealt with to any great extent, but on Sunday, when the service is always a limited one, the number of cars available was about the average. On Monday something like a normal service had been restored, and as the week went on it was gradually again brought up to its full pitch. The fact that the County Council run in the ordinary way some 1,500 or 1,600 cars, mostly of the large eight-wheeled type, indicates the amount of inconvenience arising from the stoppage. This was the most prolonged breakdown which has occurred since the County Council adopted electric traction.

Practically the whole of the lines worked by the County Council, which aggregate 141.21 miles of route, are fed from the Greenwich generating station, and the system employed is the usual high-tension three-phase method, with sub-stations scattered over the area supplied.

Readers will find a detailed explanation of all the circumstances in the appended official statement by Mr. Fell, chief officer of tramways, and in the statement made by Mr. Hume, chairman of the Highways Committee, to the meeting of the County Council on Tuesday. It remains to be said that partly owing to the skill and energy of the engineering staff, and partly to the fact that some power was obtainable from outside sources, the stoppage of the cars was shorter than would otherwise have been the case.

The following official statement of the circumstances has been sent to us by Mr. Fell, chief officer of the tramways:—

The high-tension switchgear at the London County Council's generating station, Greenwich, is undergoing reconstruction necessitated by the provision of larger turbine units in substitution of the old reciprocating engine units, and the work would have been practically finished by the end of the month. In connection with the fixing of larger cables, a wooden staging had been erected underneath the high tension switch gallery.

At 5 p.m. on the evening of December 11, under normal load, a case containing oil-immersed instrument transformers exploded with great violence, scattering the burning oil in all directions, and igniting the temporary wooden staging. Almost instantly the whole was ablaze, burning out the generator cables connecting the various portions of the high-tension apparatus, and shorting all the generators on load.

Three of the turbine generators running were protected by reactances and suffered no damage; two of the reciprocating engine generators had no reactances fitted, as they will shortly be removed, and as a consequence of the short circuits several stator coils were damaged.

A complete shut-down resulted, and as soon as the plant was cool enough to handle, steps were taken to ascertain the damage and effect repairs. One unit was connected up and running in twelve hours, and a second unit in twenty-six hours; the remaining units were replaced one each day, and the whole of them were at work within a week of the shut-down, with permanent cable connections, and the two engine generators were also repaired.

The instrument transformers were constructed in 1904, and were rebuilt for a larger capacity five years later. They have been in constant work since 1910, and are of a similar type to others in the station, which, though they have been at work for some ten years, have given no trouble. Had the accident not occurred, the transformers which failed would have been replaced by more modern ones within a few days, and the staging would have been removed.

Whilst the repairs were proceeding, a restricted car service was run by energy obtained from the London Electric Supply Corporation, the North Metropolitan Tramways, the County of London Electric Supply Company, the London United Tramways Company, the Leyton Urban District Council, and the West Ham Borough Council. A special cable was connected from the generating station of the St. Pancras Borough Council to a local tramway sub-station, and a supply was given on the evening of December 12.

L.C.C. TRAMWAY MATTERS.

The principal topic of interest at the meeting of the London County Council on Tuesday was the accident at Greenwich generating station on the previous Friday evening, which caused the total stoppage of the tramway service until Sunday morning. Mr. Hume, the chairman of the Highways Committee, in reply to various questions, gave a full explanation of the circumstances, and commended the officers and employees concerned for the great efforts which they made to complete the repairs at the station in order to re-establish the service at the earliest moment possible. Mr. Hume's statement is summarised below.

RECONSTRUCTION OF TRAMWAYS.

The Highways Committee presented a report on the reconstruction of tramways in Burdett Road, Grove Road, etc., and recommended that the estimate of capital expenditure of £70,270 be approved in respect of the reconstruction of the tracks in West India Dock Road, Burdett Road, Grove Road, Lauriston Road, and Church Crescent. On July 28 last the Council approved a capital estimate of £63,000 for the reconstruction of a part of the trackwork. The Highways Committee have since had under consideration the question of the arrangements to be made for the reconstruction of the trackwork of the remainder of this route. They have made an arrangement with the Hackney Metropolitan Borough Council by which the Council is to be relieved from its present obligation for the maintenance of paving beyond the normal tramways area on the portion of the route in Hackney, subject to the Council paving the sides of the carriageway when the tramway tracks are reconstructed. The cost of these paving works, and of the reconstruction of the trackwork north of Penhurst Road, including the construction of a short terminal portion of single line in Lauriston Road, near its junction with Terrace Road, is estimated at £14,000. The Highways Committee, in their report on July 18, 1914, stated that in view of the fact that the consent of the Stepney Metropolitan Borough Council to the reconstruction of the portion of the tramways in the borough of Stepney on the overhead system had not been obtained, it was proposed for the moment to deal with the reconstruction of the trackwork only, but in such a way that at a later date it would be possible to instal the overhead equipment without disturbing the reconstructed track. In order to minimise this disturbance, it was now proposed that the cables, ducts, etc., be laid simultaneously with the reconstruction of the trackwork. The estimated cost of the electrical equipment of the lines, exclusive of the overhead work, is as follows:—

Cables, ducts, etc.	£2,855
Sub station equipment	2,270
Cars	7,600
	£12,725

Provision for the cables, ducts and cars has been made in estimates already approved by or submitted to the Council. The recommendation of the Highways Committee that the estimate of £63,000 be cancelled, and that the new estimate of £79,270 to cover the cost of the work proposed to be carried out along the whole route be approved, was deferred.

TRAMWAY EMPLOYEES' SICK FUND.

The Council adopted the proposal of the Highways Committee that an annual contribution not exceeding £50 should be continued to the Sick Fund. This fund has been established in the tramways department since 1899, having previously been in existence in connection with the undertaking of the London Tramways Company, which was acquired by the Council in that year. There are now 306 members, who pay to the fund a monthly contribution of 1s. 6d. each, which entitles them to sick pay of 12s. a week for eight weeks, 6s. a week for a further period of eight weeks; and a payment of £10 at death, and £5 upon the death of a member's wife. Except in the case of 35 members (who are granted half-pay) no payment of wages is made by the Council during absence from duty on account of illness.

TRAMWAY BREAKDOWN.

In reply to questions, Mr. G. H. Hume, chairman of the Highways Committee, took that opportunity of giving information to the Council as to what had really happened at the generating station on Friday, 11th inst. The whole trouble had arisen from the bursting of a transformer, one of the series which was situated between the generators and the switchboard, and it was used for the purpose of stepping down the high voltage to the low voltage required for the measuring instruments on that board. It was a transformer which had been in use for something like ten years. It was the last of its type in the station. In another five days that transformer would have been removed from service altogether. Unfortunately it exploded before that was done. The next thing was that owing to extensions which were being carried out a heavy wooden staging was in position over the top of the switchboard. Burning oil was thrown out from the transfomer covering, setting the woodwork ablaze. The staging happened to be in the vicinity of the heavy cables running from the generators to the switchboard, and the intense heat generated destroyed those cables and completely cut off the generators from the switchboard, and therefore shut down the station. One thing might be of some consolation to the Council—viz., that in the heavy electrical surgings set up in consequence of the sudden shock, the protective devices which had been adopted subsequent to the last accident which occurred, worked efficiently, and protected the whole of the generators which had been fitted with the devices, and no harm occurred. Two generators, which had not been protected because they were connected with reciprocating engines which were being removed, broke down, and fortunately they took a very short time to put right. The results of this accident could not have arisen had it not been for the amount of woodwork in the station, which was there simply as a temporary matter while the switchboard arrangements were being made. The accident might have been worse. It was not in any way due to a fault of the system; it was simply due to special circumstances. The whole system would be in full working order by Thursday. That day, as a matter of fact, they already had 1,400 cars running.

Another Runaway Accident.—Last Monday a car on the lines of the Potteries Electric Traction Company ran away on an incline at Porthill, Longport, left the rails at a loop, and crashed into a milk cart. The driver of the car was found dead at his post and the conductor and two passengers were injured. Apparently the driver had died from some cause other than the shock of the collision. Another peculiarity of the case is that the car ran safely through two loops before reaching the one at which it was derailed.

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MISCELLANEOUS NEWS AND NOTES.

Christmas Holidays.—Owing to the Christmas holidays, our issue for next week will be published on Thursday morning, December 24. Correspondents are requested to note, therefore, that all communications intended for that issue should be received not later than noon on Wednesday.

Half Fares for children under 14 years of age are now being granted by the London County Council tramways on Saturdays, Sundays and Bank Holidays.

Accrington Corporation has renewed its agreement with the Post Office for the carriage of mails and Post Office servants on the tramcars for another five years at £175 per annum.

Extensions at Walsall.—In connection with a new street, the Walsall Tramways Committee propose to proceed with the construction of a length of tramway at an estimated cost of £3,683.

Energy Costs at Southampton.—Southampton Electricity and Tramways Joint Committee have decided to reduce the charge for electric energy for the tramways by ¼d. per unit after April 1 next.

Scholey and Co., Ltd., have been appointed the British representatives of the Taylor mechanical stoker interests, which are controlled in the United States by the American Engineering Company.

Motor Omnibuses at Halifax.—Provision in being made in the Halifax Corporation Tramways Bill, subject to certain conditions, to provide a service of motor omnibuses from Mytholmroyd to Cragg Vale. The extension of the tramway track from Southowram Bank Top to the village of Southowram is also under consideration.

Ashton-under-Lyne Town Council have deputed a standing subcommittee to consider the advisability or otherwise of taking over, in conjunction with other neighbouring authorities, the undertaking of the Oldham, Ashton and Hyde Electric Tramways, Ltd. The sub-committee will confer with the neighbouring authorities and report.

Increased Plant for Dover.—The Electricity Committee has reported that owing to the increase in the demand for lighting current, additional plant will be required at the electricity works after October next. The engineer proposes the installing of a 1,000 kw. turbine, which is twice the capacity of the two machines now in the work.

New Type of Car at Glasgow.—Colonel Druitt, on behalf of the Board of Trade, has now approved of the new tramway car described in our issue of December 10, and it is expected that it will shortly be put into regular service. The principal feature of the car, as already indicated, is the arrangement of the seats on the upper deck, swivelling chairs being provided.

Rhondda Railless Routes.—The first car was run over the new railless route of the Rhondda Tramway Company on December 10 by Mr. H. Holliday, the general manager. The line commences at Pentre Bach, and connects the Rhondda district with Tonyrefail and Gilfach Goch. After the opening of this route, which will take place shortly, this section of the Rhondda district will be completely covered by the tramway system.

Military Authorities to Pay for Tramway Extensions.—At a meeting of York Corporation, the Tramways Committee reported that an application had been submitted to them on behalf of the military authorities for certain extensions of the tramways to give them facilities for carrying the large amount of stores which they have to deal with at the present time direct from the railway to the depot. The authorities had intimated that they were willing to advance, if necessary, the moneys for the extensions, estimated at £4,700 and pay carriage, on terms to be agreed upon. The Committee asked the Council to authorise them to conclude an arrangement with the military authorities in regard to the proposals. The report was adopted.

Coventry Chain Employees at the Front.—The employees of the Coventry Chain Company, Ltd., Spon End, under the supervision of a specially appointed committee selected from the management, staff and works, organised a collection with the object of forwarding a parcel of creature comforts to each of their 140 fellow-employees serving with the colours, with the result that they have been able to send to each a package containing a pair of socks, a handkerchief, tobacco, cigarettes, pipe and chocolates, while a woollen article of clothing, knitted by the members of the Ladies' Recreation Club in connection with the firm, has been sent to each member. Many letters of thanks have been received from the recipients expressing their thanks for the gifts.

CONTRACTS AND ORDERS.

Siemens Brothers Dynamo Works, Stafford, have an order for rotary converters for Walsall Electricity Committee.

Mr. J. W. Pearce, of Doncaster, has been awarded a contract for the construction of tramway track in Hull Road, York, by the York Corporation, at a cost of £22,203.

The British Thomson-Houston Company's tender for a 2,000 k.w. turbo-alternator with condensing plant, at £6,718, has been accepted by the Barrow-in-Furness Corporation.

The British Westinghouse Electric and Manufacturing Company have an order from the Walsall Electricity Committee for three sub-station static transformers and for sub-station switchgear.

Clough, Smith and Co., Ltd., Spencer House, South Place, London, E.C., have secured from the Bradford Corporation the contract for the erection of a 6,600 volt, high tension transmission line from Bolton Hall Road to Round Wood, Esholt.

The Cunard Steamship Company, Ltd., have accepted the tender of the General Electric Company for twelve months' supply of Osram ship lighting lamps, and of the Edison and Swan United Electric Light Company for twelve months' supply of Royal Ediswan lamps.

Walsall Tramways Committee have accepted the following tenders for annual supplies:—National Rail and Tramway Appliances, brake blocks; Siemens Bros. and Co., tantalum lamps; Alfred Wiseman, Ltd., pinion wheels; S. Peace and Son, strand wire; British Insulated and Helsby Cables, mechanical ears; Anti-Attrition Metal Company, trolley wheels; Dermatine Company, point rubbers; Dyer and Young, controlling fingers; J. North Hardy and Son, linen frame tape and linen tape; British Thomson-Houston Company, paragon tape and acme tape; P. R. Jackson and Co., armature coils; Heap and Johnson, carbon brushes; Pinchin, Johnson and Co., air drying voltalac; Glacier Anti-Friction Metal Company, gearing metal; Slack, Sellars and Co., track saw blades.

PERSONAL.

Mr. M. E. Curwen, European manager of the J. G. Brill Company, sailed from Liverpool on Wednesday by the "Lusitania" on a visit to the United States.

Mr. S. Hann, borough electrical engineer of Stoke Newington, has joined the Royal Naval Division (Public School section), his Council having granted him leave of absence for the purpose.

Mr. W. E. Mandelick, the secretary of the Underground Electric Railways Company of London, sailed on the "Lusitania" on Wednesday for his annual trip to the United States.

Scholey and Co., Ltd., inform us that on and after December 24 their address will be 56, Victoria Street, Westminster, S.W. (Telegrams: Scolanco Sowest London; telephone: Victoria 6663, two lines.)

Conductor F. Swallow has been presented by Bradford Tramways Committee with a merit badge and £5 for presence of mind in averting accident. A car began to run backwards down an incline and the conductor reassured a number of passengers and prevented them from jumping off. The car was pulled up after running a short distance.

Mr. J. C. Cameron, who was recently appointed manager of the Northampton tramways, came to Northampton in 1904 as an engineer for the International Electrical Engineering Company, who were engaged in the erection of the power station. For the past seven years he has been chief electrical engineer of the station. He is the son of Mr. John Cameron, manager of the Blackpool and Fleetwood Tramroad Company.

ISLE OF THANET ELECTRIC TRAMWAYS AND LIGHTING COMPANY, LTD.

The ordinary general meeting of this company was held on Thursday last, the 17th inst., at Winchester House, Old Broad Street, E.C., Mr. A. R. Monks (chairman of the company) presiding. The Secretary (Mr. J. Barber Glenn) having read the notice convening the meeting and the auditors' report,

The Chairman then said that the debenture loan had increased by £100,000 mainly to cover electrical installations, new plant, motor omnibuses, electrical stores, etc. Out of revenue account money had been expended in respect of repairs to permanent way on the front and at Madeira Road and Canterbury Road, as also in relaying some rails and in repairing rolling stock. During the year £11,725 was expended on new electrical installations to meet the growing demands for lighting and power, which were effecting a considerable saving in coal consumption. The company had 195 extra consumers, although the company would not feel the benefit during the present year. The item of £815 was for motor omnibuses which had been delivered and upon which the company was making a reasonable amount of profit, but in August the chassis had been commandeered by the Government, and they were left with the bodies; these they were now replacing. Regarding the item for new plant, £11,725, he had said at the meeting last year that they were making arrangements for the instalment of a Curtis turbine. This had now been carried out, and the machine had worked most satisfactorily and economically. With the completion of this turbine there would be no expenditure for new plant, beyond a few hundreds or so, for many years. The increase in expenditure on revenue account was caused by increase in wages, but against this they had run 45,000 additional car miles; the maintenance was a little higher and rates were also higher, etc. As regards traffic up to July, the traffic showed an increase from October 1, 1913, of £1,255, compared with the same ten months in the previous financial year, but in August, upon the declaration of war, the visitors fled, and the traffic receipts fell from day to day, and eventually the company made a loss of over £4,000. But for the war, not only would the company have made that £4,000, but the directors anticipated that there would have been an additional £2,000, and electrical lighting would have been considerably increased. Up to the end of the financial year the sale of electricity showed an increase of £1,306, or nearly 13 per cent. over last year. The directors did not see their way to pay a dividend on the preference shares at the present time, but hoped to be able to pay 2½ per cent. later. The Chairman then formally moved that the directors' report and accounts for the year ended September 30, 1914, be received and adopted. This was seconded by Mr. Henry Brown and carried unanimously.

The retiring directors and the auditors having been re-elected, the proceedings closed with a vote of thanks to the chairman and directorate.

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FINANCIAL REPORTS AND MEETINGS.

The Yorkshire (West Riding) Electric Tramways Company.—The directors have decided to pay on January 1 a final dividend of 3 per cent., being at the rate of 6 per cent. per annum on account of the dividend accrued on the 6 per cent. cumulative preference shares.

Douglas Southern Electric Tramways.—In the report of this undertaking for the year ended October 31, 1914, it is stated that the company's season consisted of 112 days, as compared with 126 days last year. The total traffic receipts were £3,840, as compared with £6,492 for the previous year. The great decrease in the number of passengers carried was entirely attributable to the war. The directors recommend a dividend of 1½ per cent. upon the 7 per cent. preference shares, carrying forward £317. Last year the full dividend was paid on the preference shares and 3½ per cent. on the ordinary shares.

Blackpool, St. Anne's and Lytham Tramways.—In the report for the year ended October 31, the directors state that the traffic receipts show a very considerable decrease due entirely to the outbreak of war. Under the circumstances the trustees for the debenture holders have decided to make no distribution of interest on the debenture stock. The net revenue amounted to £24,627, as compared with £29,146 in the previous year. The expenses were less by £1,700, but the balance available for distribution is only £2,274, against £5,056 a year ago. The debit balance on the profit and loss account at the end of the previous financial year was shown as £34,103. The usual sum of £1,500 has been placed to the sinking fund, and £7,500 is required for interest on debenture stock. This brings up the total debit to £43,103, and when the £2,274 profit on the revenue account is set off against it, there is a deficiency of £40,828 to carry to the balance-sheet.

WEEKLY TRAFFIC SUMMARY.

TRAMWAYS AS A WHOLE.

The official traffic returns of 57 of the principal undertakings of the United Kingdom for the week ended December 12 give total receipts of £209,856, or £3,930 more than in the corresponding week last year. The total length of track was 2,630 miles, or 24 more than for the corresponding week. The receipts this year were at the rate of £79 15s. 10d. per mile of track, and last year at the rate of £79 0s. 4d., thus giving an increase for the past week of 15s. 6d. per mile open.

Coal Market.—Owing to the difficulties of navigation and scarcity of supplies in consequence of the demand of the Allied Admiralties, quotations can now be given only at time of actual delivery.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return.		Aggregate		Increase or Dec.
		1912-3.	1913-4.	Wks.	1913-4.	
Anglo-Argentine	Dec. 9	£64 856	£52,112	49	£2,636,330	— £91,575
Auckland (28 days)	Nov. 20	10,497	19,891	20½	104,518	+ 12,264
Ballarat and Bendigo	Oct. 11	3 629	3,312	28	23,934	— 588
Brazilian St. Rly. Mlrs	May	44,820	50,287	43	523,872	+ 76,626
Brazilian Trctn. Mlrs.	October	6,098,850	6,241,170	43	61,411,258	+ 1,488,593
Brisbane	Nov.	27,053	28,600	47	317,221	+ 30,150
British Columbia $	October	753,561	661,000	17	2,676,851	— 338,004
Buenos Aires Pt. & City	June	6,791	6,738	26	43,250	+ 3,143
Buenos Aires Lacrosse	July	45,221	43,327	4	43,327	— 1,894
Calcutta	Dec. 12	65,644	62,189	49	32,65,929	+ 32,711
Cape Town	October	12,293	12,682	17	49,456	+ 2,953
Carthagena & Herreria	Nov.	1,922	1,879	47	24,067	— 4,098
Cordoba	October	13,278	12,919	30	94,886	+ 883
East India	Nov.	1,922	2,029	17	8,128	+ 295
Kalgoorlie	Sept.	3,068	2,864	38	23,980	— 2,467
La Plata	Nov.	5,409	4,540	47	50,933	— 4,907
Lima	Sept.	34,177	28,786	48	300,472	— 210
Lisbon Mlrs.	July	184,715	171,179	31	1,145,064	+ 45,838
Madras (14 days) Rs.	Nov. 30	25,530	24,558	47	6,10,734	+ 24,421
Manila $	Nov.	154,950	129,000	47	1,470,664	— 77,056
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	October	65 000	68,328	43	619,714	+ 23,721
Mexico $	October	616,007	558,990	43	6,072,755	+ 340,417
Montevideo	Nov	30,581	27,081	4	27,081	— 3,450
Port Elizabeth	October	3.553	3,372	17	12,523	— 538
Puebla $	October	68,000	49.100	43	583.600	+ 4,900
Rangoon	Nov.	5 686	4,403	47	55,062	— 2,223
Shanghai $	Nov. 11	24,551	24,993	...	...	...
Singapore $	N v. 7	12.635	10,878	...	507,537	— 80,852
Toronto $	Octo e	861,285	849,636	43	8,471,748	+ 427,038
Winnipeg $	October	357,313	330,562	43	3,402,502	+ 63,754

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return.			Aggregate.		
		1913-	1914.	Incr. or Dec.	Wks	1913-4.	Increase or Dec.
Aberdeen Corporation	Dec. 9	£1,415	£1,610	+ £195	28	£46,861	+ £918
Accrington Corp.	Nov. 25	569	416	— 153	34	18,717	— 1,132
Ayr Corporation	Dec. 12	235	218	— 17	30	11,711	— 1,000
Bath Electric	,, 9	741	720	— 21	49	46,936	— 46
Birkenhead Corp.	,, 18	1,259	1,219	— 40	36½	46,402	— 1,614
Birmingham Corp.	,, 12	12,526	12,216	— 310	37	446,693	+ 10,352
Blackburn Corporation	,, 9	1,185	979	— 206	37	47,880	— 1,022
Blackpool Corporation	,, 10	467	572	+ 105	37	65,298	— 9,784
Bolton Corporation	,, 13	2,710	2,415	— 295	37	100,383	— 1,285
Bournemouth Corp.	,, 16	1,626	1 741	+ 115	37	76,454	— 3,825
Bradford Corporation	,, 12	5 994	5,933	— 61	37	229,168	+ 8,868
Brighton Corporation	,, 13	821	812	— 9	36½	41,787	— 459
Bristol	,, 11	6,923	7,920	+ 997	49½	421,904	+ 25,155
British Elec. Federatn	•	...	...	...	...	...	...
Burnley Corporation	Dec. 12	1,633	1,303	— 330	37	56,823	— 6,537
Burton-on-Trent Corp.	,, 13	292	264	— 28	37	11,055	+ 216
Bury Corporation	,, 6	1,290	1,128	— 162	35½	49,860	+ 228
Cardiff Corporation	Nov. 28	2,619	2,342	— 277	34	96,453	+ 18
Chatham and District	Dec. 10	850	987	+ 137	49	47,413	+ 1,772
Chesterfield Corp.	,, 10	248	243	— 5	36	9,812	— 306
Colne Corporation	,, 12	239	192	— 47	...	...	...
Cork Electric	,, 10	474	424	— 50	49	24,488	— 192
Croydon Corporation	,, 4	1,566	1,528	— 38	35	51,356	+ 1,959
Darlington Corporation	,, 12	231	244	+ 13	37	9.754	+ 515
Derby Corporation	,, 12	899	900	+ 1	36½	37,288	+ 722
Dover Corporation	,, 12	182	229	+ 47	37	9,506	+ 49
Dublin & Lucan	,, 11	118	106	— 12	23½	3,412	— 40
Dublin United	,, 11	5.161	5,405	+ 384	49	288,701	+ 19,052
Dundee City	,, 9	1,208	1,238	+ 30	29½	38,589	— 709
East Ham Corporation	,, 12	994	1,200	+ 206	36½	43,388	+ 6,065
Exeter Corporation	,, 11	300	306	+ 6	37	18,148	+ 215
Gearless Motor 'Buses.	•	..	..	...	...	...	...
Glasgow Corporation	Dec. 12	20,643	20,147	— 496	27	563,983	— 927
Glossop (U. Elec. Supply	,, 12	118	96	— 22	50	5,980	— 472
Halifax Corporation	,, 8	1,840	1,851	+ 11	36	80,379	+ 2,779
Hastings & District	,, 9	704	724	+ 20	50	49,463	— 3,076
Huddersfield Corp.	,, 12	1,990	2,270	+ 280	37	106,917	+ 8,622
Hull Corporation	,, 12	3,120	2,898	— 222	37	114,499	— 1,810
Ilford U.D.C.	,, 12	430	598	+ 173	36	20,951	+ 4,270
Ilkeston Corporation	,, 16	122	111	— 11	37	4,827	— 240
Ipswich Corporation	,, 12	368	384	+ 16	37	17,098	— 264
Isle of Thanet	,, 12	294	266	— 28	10	3 567	— 542
Kilmarnock Corp.	,, 12	162	149	— 13	30	4,926	— 443
Lanarkshire	,, 10	1,731	1,699	— 32	49	91,481	+ 6,812
Lancashire United	,, 9	1,484	1,443	— 41	49	79,814	+ 3,256
Leeds City	,, 12	5,958	8,015	+ 2,057	37	304,866	+ 1,784
Leicester Corporation	,, 12	2,729	2,798	+ 69	50	141,705	+ 2,314
Leith Corporation	,, 12	638	653	+ 15	30	21,908	+ 215
Leyton U.D.C.	,, 10	1,311	1,384	+ 73	35	49.756	+ 2,167
Liverpool Corporation	,, 12	13,091	12,446	— 645	49½	648,148	+ 7,372
Llandudno & Colwyn B.	,, 11	144	157	+ 13	1	157	+ 13
London County Council	,, 9	42,752	46,236	+ 3,484	36	1,605,296	+ 77,891
London Gnl. Omnibus	•	..	...	...	...	...	...
London United	•	..	..	...	..	...	...
Lowestoft Corporation	Dec. 12	160	170	+ 10	10	1,879	— 158
Maidstone Corporation	,, 10	170	162	— 8	37	7,923	+ 121
Manchester Corp.	,, 12	17.617	16,442	— 1,175	37	636,612	— 12,251
Met. Elec. Trys.	•	..	..	...	...	...	...
Nat. Steam Car Co., Ld.	Dec. 14	4,041	3,475	— 566	6	21,984	— 1,380
Nelson Corporation	,, 12	176	136	— 40	36½	6,394	— 916
N'castle-on-Tyne Corp.	,, 12	4,971	5,624	+ 653	37	201,675	+ 20,780
Newport (Mon.) Corp.	,, 5	760	743	— 17	36	29,496	+ 1,675
New St. Helens & Dist.	,, 9	769	854	+ 85	28	22,012	+ 1,972
Northampton Corp	,, 11	515	564	+ 49	36½	21,899	+ 443
Nottingham Corp.	,, 10	3,256	3,114	— 142	36½	123,910	+ 627
Oldham Corporation	,, 13	2,163	1,938	— 225	38	82,875	— 1,329
Portsmouth Corp.	,, 12	1,957	2,003	+ 46	37	89,881	...
Preston Corporation	,, 9	828	859	+ 16	37	33,805	+ 892
Provincial	,, 12	1,703	1,773	+ 70	10½	20,191	+ 2,177
Reading Corporation	,, 10	662	656	— 6	36	25,891	+ 310
Rhondda	,, 10	1,169	1,067	— 102	49	60,120	+ 723
Rochdale Corporation	,, 12	1,472	1,400	— 72	37	59,675	+ 91
Rotherham Corp.	,, 16	1,004	948	— 56	37	38,314	+ 859
Salford Corporation	,, 14	5,261	4,627	— 634	36	185,077	— 2,214
Sheffield Corporation	,, 13	7,687	7,779	+ 92	37½	290,221	+ 6,568
Southampton Corp.	,, 9	1,200	1,235	+ 35	36	48,767	— 314
Southend-on-Sea Corp	,, 9	650	617	— 33	35	38,671	+ 2,097
South Met. Trys.	•	..	..	...	...	...	...
South Shields Corp.	Dec. 12	653	665	+ 12	36½	28,226	+ 1,639
Sunderland Corp.	,, 13	1,344	1,314	— 30	37	54,678	+ 886
Sunderland District	,, 9	527	507	— 20	6	3,661	— 225
Swindon Corporation	,, 9	157	168	+ 11	37	6 541	+ 442
Torquay	,, 10	382	345	— 37	49	27,147	— 3,801
Trys. (M.E.T.) 'Buses	•	...	...	...	...	...	...
TynesideTrys. & Tmrds	Dec. 9	446	517	+ 71	24	14,564	+ 2,113
Wallasey Corporation	,, 12	1,089	1,033	— 56	36½	46 839	+ 1,073
Walsall Corporation	,, 12	630	652	+ 22	50	31,354	+ 218
Walthamstow U.D.C.	,, 12	692	722	+ 30	37	30,188	+ 2,583
Warrington Corp.	Nov. 26	457	394	— 63	34	14,975	— 417
West Ham Corporation	Dec. 10	2,649	2.793	+ 144	36	103,148	+ 3,710
Wigan Corporation	,, 10	1,460	1,349	— 111	36	52,939	— 1,640
Wolverhampton Corp	,, 16	1,069	1,022	— 47	38	39,377	— 1,266
Yorkshire (W. Riding)	,, 13	1,293	1,312	+ 19	50	72,222	— 25

• Issue of Traffic Returns suspended during the War.

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THE

Tramway & Railway World

Vol. XXXVI. No. 32.] LONDON, SATURDAY, DECEMBER 26, 1914. [Established in 1892.

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Including sixty-four issues, of which twelve are large Illustrated numbers, printed on fine art paper.

NOTICES.

All Communications and Advertisements for next week's issue should be received not later than noon on Friday.

Advertisements for the next issue of which proof is desired should reach us by the second post on Wednesday.

The Editorial and Publishing Offices of "The Tramway and Railway World" are at Amberley House, Norfolk Street, London, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone: No. 2948 GERRARD.

WEEKLY LIST OF TENDERS INVITED.

COUNTY BOROUGH OF BIRKENHEAD.

BIRKENHEAD CORPORATION ELECTRICITY SUPPLY.

The Corporation of Birkenhead invite tenders for the supply of Electric Motors and Motor Starters from ¼ to 15 h.p. which may be required during the twelve months ending December 31, 1915.

Copies of the specifications, with forms of tender and general conditions, can be obtained on application to the Borough Electrical Engineer, Mr. G. P. Shallcross, Corporation Electricity Works, Craven Street, Birkenhead, on the payment of a fee of £1 1s., which will be returned on receipt by the Corporation of a *bonâ-fide* tender.

Tenders, which must be on the printed form supplied, sealed and endorsed "Tender for Electric Motors and Motor Starters, Electricity Department," must be sent in to me not later than 9 a.m. on Tuesday, January 12, 1915.

Parties whose tenders may be accepted will be required to enter into a contract containing a clause as to the payment of the rate of wages, and the observance of the hours of labour and conditions recognised and agreed upon between the trades unions and the employers in Birkenhead, or in the locality in which the work for carrying out the contract is executed, as the case may be.

The Corporation do not bind themselves to accept the lowest or any tender, and reserve to themselves the right of accepting the whole or any portion of a tender.

By order, J. FEARNLEY,
Town Clerk.

Town Hall, Birkenhead,
December, 1914.

COUNTY OF LONDON.

The London County Council invites tenders for the Roadwork and Plate-laying required for the Reconstruction of the Trackwork for the Overhead System of Electric Traction of the Horse Tramways in Grove Road and Burdett Road, etc. The contractor will be required to use the rails with their fastenings, and the special work for the various turnouts, crossovers, etc., which will be provided by the Council under other contracts, but all the remaining metal work and other materials will be included in the contract.

The specification, bills of quantities, form of tender, drawings, etc., may be obtained on and after Tuesday, the 29th instant, from the Council's Chief Engineer, Mr. G. W. Humphreys, at the County Hall, Spring Gardens, S.W., after payment to the Cashier of the Council of £5. This amount will be returnable only if the tenderer shall have sent in a *bonâ-fide* tender, and shall not have withdrawn the same. The contract documents may be inspected before the payment of the fee.

The person whose tender is accepted will be bound by the contract to pay wages at rates not less and to observe hours of labour not greater than the rates and hours set out in the Council's list. Particulars of the Council's Standing Orders as to its conditions of tender and contract are given in every issue of the *London County Council Gazette*. No tender received after 11 a.m. on Tuesday, January 26, 1915, will be considered. The Council does not bind itself to accept any tender.

LAURENCE GOMME,
Clerk of the London County Council.

County Hall, Spring Gardens, S.W.
December 21, 1914.

GREAT WESTERN RAILWAY.

The Directors of this Company are prepared to receive tenders for the Supply of about 138 tons of Steel Bridge Girders and other Iron and Steel Work of British manufacture.

Plans and specification may be seen and forms of tender and bills of quantities obtained at the Office of the Engineer at Paddington Station on and after Tuesday, the 29th instant, between the hours of 10.0 a.m. and 4.0 p.m.

Tenders, addressed to the undersigned and marked outside "Tender for Girderwork," will be received not later than 10.0 a.m. on Tuesday, January 12, 1915.

The Directors do not bind themselves to accept the lowest or any tender.

A. E. BOLTER,
Secretary.

Paddington Station, London,
December 21, 1914.

BOROUGH OF HORNSEY.

The Town Council invite tenders for the supply, delivery, and complete erection of Extra-high Tension Switchgear, and also for the supply and delivery of Extra High Tension Three-core Cable.

Forms of tender may, after 10s. 6d. has been deposited with the Borough Treasurer in respect of each or either of the above tenders (to be refunded to *bona-fide* tenderers after tenders have been considered), be obtained of the Borough Electrical Engineer, at the Electricity Works, Tottenham Lane, Hornsey, N.

Tenders, endorsed "Tenders for E.H.T. Switchgear" or "Tenders for E.H.T. 3-Core Cable," to be delivered or sent by post, so as to be received in the Town Clerk's office by 12 (noon) on Tuesday, the 29th inst.

The Council reserve to themselves the right to decline all, or any, or any portion of any, of the tenders sent in.

F. D. ASKEY,
Town Clerk.

Town Clerk's Office, Town Hall,
99, Southwood Lane, Highgate, N.,
December 1, 1914.

HONG KONG ELECTRIC COMPANY, LTD.

Messrs. Preece, Cardew and Snell are instructed to invite tenders for the following Plant and Cables required for the North Point Generating Station in Hong Kong.

No. 1. Two 1,500 k.w. (2,000 k.v.a.) turbo-alternators with condensing plant and switchboards.
No. 2. Extra high tension cable.
No. 3. Substation switchboards and transformers.

Specifications, general conditions and forms of tender may be obtained from Messrs. Preece, Cardew and Snell, 8, Queen Anne's Gate, Westminster, S.W., on payment of a deposit of £1 for each section (two copies), which sum will be refunded on receipt of a *bonâ-fide* tender. Extra copies of each specification can be obtained on payment of 2s. 6d. each (non-returnable).

Sealed tenders, in duplicate, endorsed "Hong Kong," to be delivered to Messrs. Preece, Cardew and Snell, 8, Queen Anne's Gate, Westminster, S.W., on or before noon on Friday, January 15, 1915.

MANCHESTER CORPORATION TRAMWAYS.

The Tramways Committee of the Manchester Corporation are prepared to receive tenders for the supply of the following, viz.:—

(a) Permanent Way Special Track Work.
(b) Permanent Way Points, Tongues, and Hardened Steel Centres.

Specifications and forms of tender may be obtained on application to Mr. J. M. McElroy, General Manager, Corporation Tramways, 55, Piccadilly, Manchester, on deposit of £1 1s. for *each* specification, which will not be returned except on receipt of a *bonâ-fide* tender. Tenders are to be addressed to the Chairman of the Tramways Committee, 55, Piccadilly, Manchester, and must be received not later than 10 a.m. on Tuesday, January 19, 1915.

The Committee do not bind themselves to accept the lowest or any tender.

THOMAS HUDSON,
Town Clerk.

Town Hall, Manchester,
December 18, 1914.

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POSITIONS VACANT.

BOROUGH OF GILLINGHAM, KENT.

ELECTRICITY DEPARTMENT.

SHIFT ENGINEER.

Applications are invited for the above vacancy.

Applicants must have had previous experience in the parallel running of three-phase H.T. Plant, and preferably Diesel Engines.

Salary 32s. 6d., rising to 40s. per week of 48 hours

JOINTER.

Applications are invited for the above vacancy.

Applicants must have had previous experience in jointing H.T. and three-core paper cables, and able to do own plumbing.

Wages to commence 35s. per week of 48 hours.

Applications for both above vacancies to be addressed to the Borough Electrical Engineer, Electricity Works, Gillingham Road, Gillingham, Kent, giving age, previous experience, and enclosing copies of three testimonials.

Canvassing will disqualify.

(By order) F. C. BOUCHER,
Town Clerk.

Corporation Offices,
Gardiner Street, Gillingham, Kent.
December 21, 1914.

TRAMWAY INSPECTORS.

Tramway Inspectors wanted for large system. Wages commencing 32s. 6d. per week, rising to 37s. 6d. Apply with full particulars of experience, state age, and enclose copies of testimonials, to Box 118, THE TRAMWAY AND RAILWAY WORLD, Amberley House, Norfolk Street, London, W.C.

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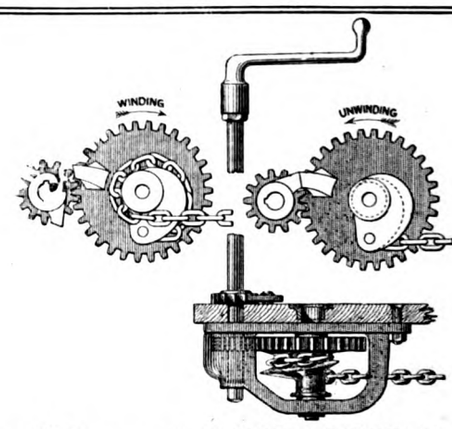

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THE
Tramway AND Railway World

Established in 1892 and Published by

THE TRAMWAY & RAILWAY WORLD PUBLISHING CO., Ltd.,
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SATURDAY, DECEMBER 26, 1914.

REAR LIGHTS ON VEHICLES.

Everybody knows or ought to know that the Metropolitan Police have issued an order making it compulsory for all vehicles to carry red rear lights after dark within the Metropolitan area. This regulation is called for by the existence of the other order which for the last two or three months has reduced the night lighting of London streets to such an extent that overtaking-vehicle collisions are very apt to occur. The liability to such accidents will, of course, be reduced to a minimum when every vehicle shows a rear light. The new regulation has been called for urgently by the special circumstance that the streets, including those carrying the heaviest traffic, are so dimly lighted. But the opportunity is a good one for extending to the whole country a reform which has been long called for and is becoming the more urgent as time goes on. Tramway interests are particularly concerned in the matter. It is now no less than ten years since Mr. Harry England, general manager of the Yorkshire (West Riding) Tramways Company, made efforts to influence opinion in favour of legislation which would render compulsory the carrying of rear lights at night by all vehicles in the country. As the Government did not take up the matter, nothing has been effected, the more especially as any such proposals raise much selfish opposition. The extension of tramways into suburban and rural areas, and the constant increase in the number of fast automobile cars, are facts which make the reform one of increasing urgency. Carts and other slow-moving vehicles on poorly lighted or unlighted roads are in constant danger of being run into from behind if they are not provided with rear lights. Various local authorities may have power to make by-laws, but what is wanted is a uniform system uniformly enforced all over the country. No doubt there are difficulties, but past experience shows that they can be overcome. Probably the earliest general legislation in this country making lighting compulsory was that of some thirty years ago by which bicycles were compelled to carry lamps showing a light in front. That was absolutely needed because of the silence of the movement of the bicycle. Within more recent years there was a prolonged Parliamentary fight over the Bill which proposed to make compulsory the carrying of front lights by all vehicles. The agricultural interest in particular claimed exemption on the ground that the trouble and expense would be too great. The Bill passed, however, and the exemptions, if any, are very limited. It took a Government to push the Act through, and we are afraid a Government's power will be necessary to carry universal rear lighting. The owners of all sorts of slow vehicles will object, and such owners have much influence owing to their numbers. The case for tail lights is, however, so strong that it should succeed if a strong effort is made. One more consideration shows the absurdity of the present state of things. Tramcars are so brilliantly lighted that only a blind driver would run into one from behind. Automobile cars are so fast that it is seldom that any other kind of vehicle collides with them from the rear, yet both tramcars and automobiles have to carry rear lights. At the same time they have to endure the constant risk on dark roads of dashing from behind into some slow cart or dray whose presence is indicated by no ray of light. We hope that Mr. England will renew his agitation, and that, with the help of others, he will successfully urge that the London rear-light order should be made permanent and that a similar provision should be applied to the whole country.

VIENNA TRAMWAYS IN WAR TIME.

The New York "Electric Railway Journal" has received from Ludwig Spangler, manager of the Vienna Municipal Tramways, some interesting particulars of the effects of the war upon that undertaking. Writing several weeks ago, Herr Spangler says that at the outbreak of war the partial mobilisation of the Austro-Hungarian Army affected the personnel of the Vienna Municipal tramways but slightly. At that time, in fact, not more than 800 out of 12,000 employees were called to the colours. In the course of the later mobilisation orders, however, they lost 4,650 men, of whom 3,100 were either drivers or conductors. At the same time the Government excused 2,500 of the older tramway men from army duty, in order that the service might be maintained. By calling upon men who had already been pensioned and by the more intensive efforts of the men who had been left behind, they were able, with a 45 per cent. reduction in the staff, to handle the 25 per cent. increase in business which occurred immediately after the heavy mobilisation period. This extra business was handled also with a reduction in car mileage, the consequences being an increased crowding of the cars.

The instruction of new employees was taken up so quickly that by the end of October they had in hand 2,800 men, of whom 1,275 were engaged in transportation service. In November the car mileage was 15 per cent. less than just before the war, and the gross earnings for October were 9 per cent. below those of October, 1913. Part of the reduction in earnings, however, was due to the great amount of free travelling granted to soldiers, who formed about one-seventh of the passengers. Another problem that the Vienna Municipal Tramways had to face because of the war was the great increase in freight transportation, due to the fact that the Army authorities commandeered so many horses and auto-trucks. Thus the tramways supply Vienna with all its milk, garden, and farm produce in connection with neighbouring inter-urban railways. The electric tramways are also being used very extensively by the Army to transfer supplies from large local warehouses to the steam trunk lines which lead to the battlefields.

The transportation of wounded soldiers from the steam railroad stations to the Vienna hospitals is carried out chiefly by electric tramcars. Ordinary cars are used for those men who can stand or sit, but in addition a number of cars have been fitted with cots and stretchers. A large part of the wounded men are transported in auto-taxis, the bodies of which have been replaced by special bodies containing hospital equipments.

The dependents of the employees who are in service have been granted certain allowances by the Government, in accordance with the law. The Vienna Municipal Tramways has also set aside a further allowance for these families, in addition to which voluntary contributions are made by the employees who have remained on the system. The latter have also raised a sum of £2,000 for the Red Cross and similar funds.

In view of the hoped-for increase in traffic after the war, 135 motor cars and 125 trailers have been ordered. The order was given at this time to save the workmen of the car builders from unemployment. Herr Spangler adds that these cars are being built at the prices that obtained before the outbreak of the war.

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GREENWICH GENERATING STATION ACCIDENT.

In order to supplement the statement made by their Chairman at the previous meeting of the Council, the Highways Committee submitted at the meeting on Tuesday the following particulars of the recent accident at the Greenwich generating station.

On the evening of Friday, December 11, the load was increasing towards the normal evening peak when a violent explosion occurred in the case containing the instrument transformers connected with one of the turbo-generators. The oil in the transformer case was ignited, and was thrown on to the surrounding cables and on to a temporary wooden staging which had been erected in connection with the reconstruction works now in progress. Although the fire was quickly quenched by the station staff, the whole of the main cables under the upper switchboard gallery connecting the eight generators with the switchboard were destroyed. the low-tension switchgear on the lower gallery was soaked with water, and several of the panels were covered with lead melted from the cables above.

As soon as it was possible to examine the damage it was realised that the supply of current could not be resumed for some hours, and the passengers in the cars were so informed. The only routes on which services of cars could be maintained were those for which current is supplied by the London Electric Supply Corporation, and this supply also enabled the cars to be removed from the tramway tracks. As the result of temporary connections made at the Greenwich generating station and of arrangements made with various authorities and private companies, it was possible to run services of workmen's cars to Woolwich Arsenal early on the morning of Saturday, December 12. The staff having continued to work day and night with the greatest energy and zeal, the services have been gradually increased and are now practically normal.

The transformer case which exploded was supplied in 1905, and was rebuilt in 1910 to suit the turbo-generators. It was examined in the early part of last month, and a sample of the oil was electrically tested with satisfactory results at the beginning of the present month. There are in the station more than 40 sets of similar transformers, none of which has given any trouble. The accident was not due to any defect in the plant, and had it not been for the presence of a large quantity of wooden staging, which caught fire, the damage would have been quite localised and would not have interfered with the working of the service.

In the opinion of the Highways Committee, very great credit is due to the staff for the expedition and skill with which they dealt with the situation and for the zeal which all have shown. They also think it right to place on record their appreciation of the ready manner in which assistance was afforded by those authorities and companies who were in a position to help the Council. Fortunately an accident in similar unfavourable circumstances is not likely to recur. In the case of so large an undertaking as the Council's tramways it is not possible to arrange for an alternative source of supply which could be adequate in all emergencies. Certain arrangements have already been made for linking up the system with other sources of electrical supply, but in order to minimise the inconvenience arising from any other accident for which it is reasonable to make provision, the Highways Committee are considering how these arrangements may be improved and extended, and they hope to submit a scheme for the Council's approval at an early date.

TRAMWAYS AND THE WAR.

Blackburn Corporation.—Early in December the Blackburn Tramways Committee decided that men in uniform must pay ordinary fares, but the decision was later amended so as to allow the running of a special car each morning to Accrington and returning in the evening. Soldiers are conveyed by these cars free of charge. The Blackburn tramway employees on Thursday of last week entertained the wives, children and mothers of the employees of the department who are now serving with the forces. The children were presented with purses containing money and with toys.

Allowances to Widows.—The Council allows all its officers and employees who are serving in the forces full civil pay less Army or Navy pay and separation allowances, and the General Purposes Committee has recommended that these payments shall be continued for a period of 26 weeks after notification of death to the widows or other dependents of those who lose their lives while so serving. The Government have stated that the widow and children of any seaman or soldier who at the time of his death was in receipt of separation allowances, would continue to receive for 26 weeks the amount which was paid to him during his lifetime as a separate allowance, and if an allotment were in force at the time they would also receive an amount equivalent to that allotment for the same period. The pensions commence at the expiration of this period.

Charles Macintosh and Company, Limited, have over 14 per cent. of their employees, who number in all 2,500, serving with the forces.

The New Trackless Routes at Keighley.—The Hutley to East Barn, and the Keighley to Oakworth trackless car routes equipped by the Keighley Corporation have been formally inspected by Colonel Druitt, on behalf of the Board of Trade.

L.C.C. TRAMWAY MATTERS.

Switchgear for Tramway Sub-Stations.

At the meeting of the London County Council on Tuesday the Highways Committee reported that they had considered the following tenders for the supply of high and low-tension switchgear for tramways sub-stations:—

Johnson and Phillips, Ltd.	£1,177 19 6
Spagnoletti, Ltd.	1,240 7 0
Ferguson, Pailin and Co.	1,275 0 0
Switchgear and Cowans, Ltd.	1,275 3 0
British Westinghouse Electric and Mfg. Co., Ltd. ...	1,324 17 0

The estimate of the chief officer of tramways comparable with the tenders was £1,100. The tenders, with the exception of that of Messrs. Ferguson, Pailin and Company, were submitted subject to the acceptance by the Council of certain model conditions of contract for the supply of electrical plant and equipment drawn up by the Institution of Electrical Engineers. The Highways Committee stated that for some time past they had been in communication with the British Electrical and Allied Manufacturers' Association as to certain conditions of contract put forward by the Association. The Association had informed them on November 20, 1914, that its members had decided to tender to the Council's future requirements, and to enter into contracts for plant only under the conditions issued by the Institution of Electrical Engineers. Before such conditions could be accepted, several substantial alterations in the Council's standing orders would have to be made, and quite apart from the consideration of the matters of principle involved, the procedure to effect these alterations would occupy considerable time. The question was receiving the serious consideration of the Committee, but in the meantime it was necessary that a decision should be come to regarding the acceptance of a tender for the supply of the high and low-tension switchgear. In all the circumstances the Committee were of opinion that the interests of the Council would best be served by the acceptance of the tender of Messrs. Ferguson, Pailin and Company.

Accommodation for Trailer Cars.

Some time ago the Council approved a capital estimate of £80,250 for the purchase of 150 new trailer cars and the equipment of 200 existing electric cars for use in connection with the trailer cars on the southern tramways. The Highways Committee now recommended that the Balham car shed should be altered, at a cost of £3,600, so as to provide accommodation for 48 trailer cars. Tractors will be required for the purpose of shunting these trailer cars inside the depôt and to and from the main tracks, and it was proposed that three petrol electric cars should be adapted for this purpose. The bodies would be removed from these cars and the underframes and trucks would be floored in and fitted with couplers at a cost of about £30 a car.

Additional Cables.

Owing to the increased car services in the Woolwich district, an additional line of low tension feeder cables is now required, and the Highways Committee recommended that the cable needed should be purchased from the Western Electric Company, Ltd., whose tender for high and low tension cable was accepted in October. The price would probably not exceed £1,000.

Provision of Rails.

The Highways Committee recommended that in future the estimates in respect of stock of stores for tramway purposes should include the rails required for construction and reconstruction purposes during the year for routes for which no capital estimates have been approved. The cost of the rails which would probably be in stock at the end of the current financial year is estimated at £20,000.

In reply to a question, Mr. G. H. Hume said that on the Friday 1,244 tramcars were stopped owing to the breakdown in Greenwich station, on Saturday 860 and on Sunday 330 cars. The full service was resumed on Friday, the 18th inst. Mr. Hume amended the report by proposing that the action taken by the Highways Committee in connection with the accident on Friday, December 11, should be approved.

Sir John Benn, in a vigorous speech, characterised by strong party bias, criticised "the parsimonious policy and the muddling neglect of the tramways," and contended that there should be a stand-by or second service of supply.

Mr. Hume, replying, said that the Highways Committee did not desire to resist an inquiry. There had been difficulties in extending the station to meet the increased load. The Admiralty delayed the extension by a whole year, but they were now making up leeway as fast as possible. The suggestion of a second station was a most uneconomical proposal. The supply they could get from outside sources was very limited, but at Greenwich station they were putting in four new sets of generators of 8,000 kw. each.

Other members having spoken, the Highways Committee's report was approved.

Montreal Tramways.—At a recent meeting of the Montreal Board of Trade (corresponding to our local chambers of commerce) a resolution was adopted approving the speedy settlement of the transport problem. There is a strong party in Montreal which advocates more stringent municipal control of the tramways which are now worked by the Montreal Tramways Company, and the topic excites great local interest. The Trades and Labour Council in the city have recently appointed a committee to study the situation and to encourage such action as seemed to be in the best interests of the public.

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MISCELLANEOUS NEWS AND NOTES.

Institution of Electrical Engineers.—The Council is desirous of completing the list of names of all members who are engaged in military or naval service. The members are desired to forward the requisite information to the secretary.

Electric Vehicle Committee.—The committee propose to make another effort to induce all electric supply undertakings to make a flat charge of one penny per unit for the supply of electrical energy for charging batteries at times other than during a peak load.

Tramway Mishap at Swinton.—The breaking of a section of overhead trolley wire caused an interruption of the service on the Swinton tramways on Sunday last between Mexborough and Rotherham. Fortunately few people were in the streets at the time and no one was injured.

New Brakes at Sheffield.—Sir William Clegg, in referring at a recent meeting of the City Council to the purchase of power brakes for double-deck cars to run on the Intake route, said that if they could get the approval of the Board of Trade they would run double-deckers on the Walkley route.

Bonuses for Bristol Tramway Employees.—In accordance with their usual Christmas time custom, the Bristol Tramways and Carriage Company have distributed £3,000 as long service and loyalty bonuses to their employees. The bonuses awarded to men on active service have been paid over to their wives or dependents.

Electric Traction in Spain.—The Companhia Hidro-Eléctrica do Varosa has received the contract for the construction and working for a period of 75 years of an electric railway, 12 kiloms. (about 7½ miles) long, from Lamego to the left bank of the Douro. Work has to be commenced within 30 days from the date of the contract and completed within two years.—*Board of Trade Journal.*

Another London Stoppage.—Through the jamming of a plough of a car in the conduit on Brixton Hill on Tuesday evening, a stoppage was caused on that route about 5 o'clock, just about the time when the peak load was coming on. At one time the line of standing cars extended for about two miles. After a short delay the service was resumed by working the traffic over a single line of rails.

Wemyss Tramway Breakdown.—The stoppage of the Wemyss tramway service, already referred to, was not wholly removed for several days. The subsidence of a part of the roadway caused by mining work was of such a depth that it was impossible to see the top of a tramway standard which sank. About 150 tons of débris were thrown into the hole before it was brought to the level of the road.

Fire at the Edison Works.—The Edison Accumulators, Ltd., inform us that the fire at the Edison Works at Orange, New Jersey, was not so serious as at first reported. The only buildings affected were those of the phonograph department. The remainder of the buildings are undamaged, including, as mentioned in our note last week, those devoted to the Edison storage battery which are working to their full capacity of 3,000 cells a day.

Aberdare Tramways and Railless Traction Extensions.—The Bill which the Aberdare Urban District Council has deposited in Parliament provides for the extension of the tramway and the railless traction installation. Powers are asked for three new lines of tramway in continuation of the existing route and aggregating five miles of track. The Council also seek powers to work railless cars on three new routes. The total estimated cost is £49,758.

"The Shop Early Movement."—The Metropolitan Street Railway of Kansas City, Mo., is encouraging the "shopping early" movement. In all its cars the company is displaying prominently placards on which is printed in green ink, surrounded by a red border, the following:—"The company requests its patrons to join the nation-wide movement by shopping early in the season, early in the week, early in the day. By request of the Kansas City Consumers' League. Shoppers should use home-bound cars early in the day."

Reduction in Coal Prices.—Expectation has been justified by the settlement, at a comparatively early date, of the railway companies' contracts for steam coal. The general state of trade indicated that some concession would have to be made by the coalowners, and a reduction of 6d. per ton has been accepted, making the new contracts at the rate of 11s. per ton for the best hards over the next year. For comparison, it may be mentioned that the price paid by the railway companies in 1911 was 8s. 9d. per ton, 1912 10s. per ton, and 1913 11s. 6d. per ton.—*Yorkshire Post.*

Tramways and Light Railways Association.—It is announced in the "Tramways and Light Railways Association Journal" for December that the annual dinner of the Association will be held as usual either in February or early in March next. The date will be announced later. The journal for December also contains a complete list of members of the Association and a list of applications made for Light Railway orders in November. None of the applications provide for the construction of new lines, the proposals being limited to extension of time and transfer of powers.

Tramway Shelters.—The Tramways Committee of Cardiff recently discussed the provision of shelters at important stopping places, and it was decided that the manager, Mr. Arthur Ellis, should consult with the city engineer, Mr. W. Harpur, on the subject. It was suggested that the shelters should take the form of a sloping glass projection built from the walls of adjoining properties, subject, of course, to the consent of the owners. Manchester proposes to construct several extensive shelters, and Leith Corporation are considering the provision of shelters at various points.

Tramway Mail Service in Suburban New York.—An electric tramway mail service has been established between Yonkers and Mount Vernon, New York, and is saving many hours in the delivery of letters. The New York Central and Hudson River Railroad passes through Yonkers and the New York, New Haven and Hartford Railroad through Mount Vernon. All the mail for Mount Vernon coming from the North and West is thrown off at Mount Vernon. Previously all mail was carried through to the Grand Central Terminal station in New York City, where it was distributed and sent out again.

Motor Omnibuses at Liverpool.—At a recent meeting of the Corporation, Alderman Fred Smith moved that the Tramways Committee be authorised to replace the motor omnibuses requisitioned by the military authorities by motor omnibuses of such make as the Committee thought desirable. He said that the Government had given intimation that they might commandeer more of their motor omnibuses. If they did, the Tramways Committee would be greatly inconvenienced. They should, therefore, take time by the forelock and provide new omnibuses. After some discussion, the motion was, however, rejected by 35 votes to 19.

Strike at Barnsley.—The car and omnibus drivers of the Barnsley and District Electric Traction Company evidently do not share the view of the great mass of working men in this country that the time of a great war is not a time for trade disputes. On December 18 some 60 of these employees of the company went on strike for an advance in wages of a penny per hour. Great inconvenience has been caused to the local public by the stoppage of the tramway and omnibus services. The strike was settled on Monday, and the services were resumed on Tuesday. The terms of the settlement have not been divulged. The news was received with great satisfaction by the people in the populous district around the town, as the stoppage had occasioned much inconvenience at this busy season of the year.

Workmen's Tickets.—A man was fined 10s. and costs at Hastings last week for having used a workman's ticket on a tramcar although he was not a workman. It was stated that the defendant was an insurance superintendent. It is surely time that this old attempt to differentiate between classes of passengers on tramcars should be abandoned generally, as it has been on so very many tramways already. The rule is difficult to enforce, the drawing of the line between a workman and a non-workman is often practically impossible, and there is great temptation to evasion, giving trouble to the tramway officials and lowering the moral rectitude of the minds of the evaders. When cheap fares are granted on certain cars or on all cars between certain hours they should be granted alike to all passengers, irrespective of occupation.

Ilford and Inter-running.—At a meeting of Ilford Urban Council, the Tramways Committee reported that they had considered a report by Mr. L. E. Harvey, the tramways manager, on the question of inter-running with London tramways. Mr. Harvey contended that any such scheme was out of the question, and that the benefit derived by comparatively few ratepayers could not justify the enormous expense and inconvenience to which the majority of the people would be put. He could see nothing to justify him in recommending the committee to adopt inter-running. He thought it would be a disastrous thing for them to entertain the idea. In view of this opinion, the committee reported that they were unable to give effect to the Council's instruction to open negotiations with neighbouring authorities, and they recommended that no action be taken. The manager had also submitted his annual report for the year ended March 31 last to the committee. In this he said that the financial result was very bad, there being a deficit of £3,567, due to decrease in receipts from omnibus competition and increase in expenses from extra mileage run. For the year now current the receipts were much more favourable. He had come to the conclusion that the undertaking would never be a profit-earning concern, and would be a burden on the rates so long as the present halfpenny fares were in existence. The committee instructed the manager to communicate with the undertakings of other towns where a change over from halfpenny fares had taken place and a universal penny fare adopted, with a view to ascertaining their experiences; also to obtain certain other information and to present a comprehensive report. The committee's proposals were adopted.

PERSONAL.

Mr. J. A. Robertson has been voted an honorarium of £200 by Greenock Corporation for his services during seven months in connection with the extension of electricity supply to Port Glasgow. Mr. Robertson is now engineer at Salford.

Mr. A. Coveney, who is relinquishing the position of electrical engineer and tramways manager, has been presented with a gold albert by the staff of the tramways and electricity department of the Erith Urban District Council. The presentation was made by Mr. W. E. Deighton, and, in response, Mr. Coveney said the efficiency of everyone connected with the department was asserted by the fact that although several million passengers had been conveyed by the cars since the commencement of the undertaking there had not been one fatal accident. He felt sure that at the end of the current year the tramways would show a profit. He cordially thanked the staff for the loyal assistance they had given him.

Cole, Marchent and Morley, Ltd.—Mr. R. S. Brailsford, Mr. W. W. Spooner and Mr. A. Brailsford have been appointed directors of this company. They have purchased the entire shareholdings of the late directors, Messrs. H. W. Morley, G. H. Hodgson and D. H. Illingworth, who, owing to the pressure of other engagements, have now retired from the directorate and management of the firm. Mr. R. S. Brailsford, who becomes

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chairman of the company, commenced his engineering career at King's College, London, and has had considerable experience with leading firms not only in Great Britain but also in the Colonies, and during the last five years he has been actively associated in the management of the company. Mr. W. W. Spooner has also had wide experience, commencing with the engineering section of Cambridge University, and with many years at some of the largest engineering firms in this country, including W. H. Allen, Sons, and Co., of Bedford, the British Westinghouse Company, Ltd., of Manchester, and Willans and Robinson, Ltd., of Rugby.

CONTRACTS AND ORDERS.

The Workington Steel Company have secured an order for 6,000 tons of steel rails for Tasmania.

A. Reyrolle and Co., of Hebburn-on-Tyne, have received an order from the Sheffield Electricity Supply Committee for 24 overload relays for sub-station switchgear.

The Paterson Engineering Company, Limited, have received an order from Paisley Town Council for water filtering plant capable of treating 5,500,000 gallons in 24 hours.

Colwyn Bay Electricity Committee have accepted the following tenders for the new power station:—Turbines and alternators, Belliss and Morcom, £7,990; boilers, Stirling Boiler Company, £3,701; switchgear, British Westinghouse Company, £7,990, and British Thomson-Houston Company, £585; rotaries, British Thomson-Houston Company, £1,547.

FINANCIAL REPORTS AND MEETINGS.

Melbourne Tramway and Omnibus Company.—The London Secretary of the Melbourne Tramway and Omnibus Company, Ltd., has received cable advice from Melbourne of the declaration of a dividend of 6d. per share for the quarter ending the 31st inst., and also a bonus of like amount, making 1s. per share.

Costa Rica Electric Light and Traction Company.—Profits for the year ended June 30 were £26,351, an increase of £2,476. The net surplus profit is £8,056, which the directors propose to write off issue expenses. The number of lamps installed in the lighting department has increased by 11 per cent. during the 12 months, and the power supply by 40 per cent.

Coal Market.—Owing to the difficulties of navigation and scarcity of supplies in consequence of the demands of the Allied Admiralties, quotations can now be given only at time of actual delivery.

FOREIGN AND COLONIAL TRAMWAY TRAFFIC RETURNS.

NAME.	Week or Month.	Latest Return.		Aggregate		
		1912-3.	1913-4.	Wks.	1913-4.	Increase or Dec.
Anglo-Argentine	Dec. 16	£61,918	£51,634	50	£2,687,964	−£101,659
Auckland..... (28 days)	Nov. 20	10,497	19,391	20½	104,518	+ 12,264
Ballarat and Bendigo	Oct. 11	3,629	3,312	28	28,934	— 583
Brazilian St. Rly. Mlrs.	May	44,820	50,237	43	523,872	+ 76,626
Brazilian Trctn. Mlrs.	October	6,098,850	6,241,170	43	61,411,258	+ 1,488,593
Brisbane	Nov.	27,053	28,600	47	317,221	+ 30,150
British Columbia .....$	October	753,501	661,000	17	2,676,351	— 338 004
Buenos Aires Pt. & City	June	6,791	6,733	26	43,250	+ 3,148
Buenos Aires Lacroze	July	45,221	43,327	4	43,327	— 1,894
Calcutta.....Rs.	Dec. 19	67,406	62,547	50	33,28,476	+ 27,852
Cape Town	October	12,223	12,682	17	49,456	+ 2,953
Carthagena & Herrerias	Nov.	1,922	1,379	47	24,067	— 4,098
Cordoba.....	October	13,278	12,919	30	94,886	+ 883
East India	Nov.	1,922	2,029	17	8,128	+ 295
Kalgoorlie	Sept.	3,068	2,864	38	23,980	— 2,467
La Plata	Nov.	5,409	4,540	47	50,933	— 4,907
Lima	Sept.	34,177	28,786	43	300,472	— 210
Lisbon ..... Mlrs.	July	164,715	171,179	31	1,143,064	+ 45,838
Madras (14 days) Rs.	Nov. 30	25,530	24,558	47	6,10,734	+ 24,421
Manila .....$	Nov.	154,950	129,000	47	1,470,694	— 77,056
Manaos	June	12,530	9,868	8	20,067	— 5,340
Melbourne	October	65,000	68,328	43	619,714	+ 23,721
Mexico .....$	October	616,007	558,990	43	6,072,755	+ 340,417
Montevideo	Nov	30,531	27,081	4	27,081	— 3,450
Port Elizabeth	October	3,553	3,372	17	12,522	— 538
Puebla .. .. $	October	68,000	49.100	43	583,600	+ 4,900
Rangoon	Nov.	5 686	4,405	47	55,062	— 2,223
Shanghai .....$	Nov. 11	24,351	24,993	...	...	...
Singapore .....$	Nov. 14	13,092	9,971	...	517,508	— 33,978
Toronto .....$	October	861,235	849,636	43	8,471,743	+ 427,038
Winnipeg.....$	October	357,313	330,562	43	3,402,502	+ 63,754

TRAMWAYS AND OMNIBUS TRAFFIC RETURNS.

NAME.	Week ended	Latest Return.			Aggregate.		
		1913.	1914.	Incr. or Dec.	Wks.	1913-4.	Increase or Dec.
Aberdeen Corporation	Dec. 16	£1,458	£1,517	+ £59	29	£48,485	+ £1,083
Accrington Corp.	Nov. 25	569	416	— 153	34	18,717	— 1,132
Ayr Corporation	Dec. 19	235	220	— 15	31	11,932	— 1,016
Bath Electric	,, 16	721	699	— 22	50	47,626	— 68
Birkenhead Corp.	,, 20	1,295	1,264	— 31	37½	47,666	— 1,645
Birmingham Corp.	,, 12	12,526	12,216	— 310	37	446,693	+ 10,352
Blackburn Corporation	,, 16	1,169	1,036	— 133	38	48,916	— 1,144
Blackpool Corporation	,, 17	459	540	+ 81	38	65,839	— 9,699
Bolton Corporation	,, 20	2,571	2,441	— 130	38	102,825	— 1,416
Bournemouth Corp.	,, 16	1,626	1,741	+ 115	37	76,454	— 3,825
Bradford Corporation	,, 12	5 994	5,933	— 61	37	229,168	+ 8,868
Brighton Corporation	,, 20	830	830	Nil	37½	42,617	— 459
Bristol	,, 18	7,396	8,461	+ 1,065	50½	430,365	+ 26,221
British Elec. Federatn.	*	...	...	...	...	...	...
Burnley Corporation	Dec. 19	1,546	1,352	— 194	38	58,175	— 6,731
Burtcn-on-Trent Corp.	,, 20	287	276	— 16	38	11,307	+ 199
Bury Corporation	,, 6	1,290	1,128	— 162	35½	49,360	+ 228
Cardiff Corporation	Nov. 28	2,619	2,342	— 277	34	96,453	+ 18
Chatham and District	Dec. 10	850	987	+ 137	49	47,413	+ 1,772
Chesterfield Corp.	,, 10	248	243	— 5	36	9,812	— 306
Colne Corporation	,, 19	241	200	— 41	...	...	...
Cork Electric	,, 10	474	424	— 50	49	24,488	— 192
Croydon Corporation	,, 11	1,541	1,564	+ 23	36	52,920	+ 1,982
Darlington Corporation	,, 12	231	244	+ 13	37	9,754	+ 515
Derby Corporation	,, 12	899	900	+ 1	36½	37,288	+ 722
Dover Corporation	,, 12	182	229	+ 47	37	9,505	+ 49
Dublin & Lucan	,, 18	121	114	— 7	24½	3,526	— 47
Dublin United	,, 18	5,298	5,850	+ 552	50	294,551	+ 19,691
Dundee City	,, 16	1,266	1,215	— 51	30½	39,754	— 761
East Ham Corporation	,, 19	1,037	1,237	+ 200	37½	44,619	+ 6,264
Exeter Corporation	,, 18	302	316	+ 14	38	13,464	+ 229
Gearless Motor 'Buses.	*	...	...	...	...	...	...
Glasgow Corporation	Dec. 19	20,879	20,093	— 786	28	584,076	— 1,656
Glossop (U. Elec. Supply)	,, 19	115	100	— 15	51	6,081	— 487
Halifax Corporation	,, 15	1,865	1,831	— 34	37	82,210	+ 2,745
Hastings & District	,, 16	752	757	+ 5	51	50,220	— 3,071
Huddersfield Corp.	,, 19	2,013	2,281	+ 268	38	109,198	+ 8,890
Hull Corporation	,, 19	3,234	3,030	— 204	38	117,530	— 2,014
Ilford U.D.C.	,, 12	420	593	+ 173	36	20,951	+ 4,270
Ilkeston Corporation	,, 16	122	111	— 11	37	4,827	— 240
Ipswich Corporation	,, 12	368	384	+ 16	37	17,098	— 264
Isle of Thanet	,, 19	293	253	— 40	11	3,820	— 582
Kilmarnock Corp.	,, 19	158	144	— 14	31	5,070	— 458
Lanarkshire	,, 17	1,773	1,673	— 100	50	93,155	+ 6,712
Lancashire United	,, 16	1,529	1,459	— 70	50	81,292	+ 3,183
Leeds City	,, 19	3,730	8,003	+ 4,273	38	312,869	+ 5,900
Leicester Corporation	,, 19	2,835	2,872	+ 37	51	144,578	+ 2,394
Leith Corporation	,, 19	642	626	— 16	31	22,535	+ 199
Leyton U.D.C.	,, 17	1,358	1,323	— 35	36	51,079	+ 2,132
Liverpool Corporation	,, 12	13,091	12,446	— 645	49½	648,143	+ 7,372
Llandudno & Colwyn B.	,, 18	142	159	+ 17	2	316	+ 30
London County Council	,, 9	42,752	46,236	+ 3,484	36	1,605,296	+ 77,891
London Gnl. Omnibus.	*	...	...	...	...	...	...
London United	*	...	...	...	...	...	...
Lowestoft Corporation	Dec. 19	199	165	— 34	11	2,044	— 192
Maidstone Corporation	,, 17	171	161	— 10	38	7,986	+ 112
Manchester Corp.	,, 12	17,617	16,442	— 1,175	37	636,612	— 12,251
Met. Elec. Trys.	*	...	...	...	...	...	...
Nat. Steam Car Co., Ld.	Dec. 21	3,960	3,417	— 543	7	25,401	+ 1,923
Nelson Corporation	,, 12	176	136	— 40	36½	6,894	— 916
N'castle-on-Tyne Corp.	,, 19	5,195	5,864	+ 669	38	207,540	+ 21,450
Newport (Mon.) Corp.	,, 5	760	743	— 17	36	29,496	+ 1,675
New St. Helens & Dist.	,, 16	736	836	+ 100	24	22,848	+ 2,066
Northampton Corp	,, 18	532	595	+ 63	36½	22,493	+ 508
Nottingham Corp.	,, 17	3,186	3,175	— 11	37½	127,086	+ 616
Oldham Corporation	,, 13	2,163	1,938	— 225	38	82,875	— 1,329
Portsmouth Corp.	,, 12	1,957	2,003	+ 46	37	89,881	...
Preston Corporation	,, 16	818	806	— 12	38	34,612	+ 880
Provincial	,, 19	1,769	1,840	+ 71	11½	22,031	+ 2,283
Reading Corporation	,, 17	660	671	+ 11	37	26,562	+ 321
Rhondda	,, 10	1,169	1,067	— 102	49	60,120	+ 723
Rochdale Corporation	,, 19	1,505	1,447	— 58	38	61,323	+ 33
Rotherham Corp.	,, 16	1,004	948	— 56	37	38,314	+ 859
Salford Corporation	,, 21	5,055	4,757	— 398	37	189,725	— 2,557
Sheffield Corporation	,, 20	7,614	8,058	+ 444	38½	298,279	+ 7,303
Southampton Corp.	,, 16	1,181	1,239	+ 58	37	50,007	— 255
Southend-on-Sea Corp.	,, 16	662	616	— 46	36	39,287	+ 2,051
South Met. Trys.	*	...	...	...	...	...	...
South Shields Corp.	Dec. 12	653	665	+ 12	36½	28,226	+ 1,639
Sunderland Corp.	,, 20	1,398	1,366	— 32	38	56,044	+ 853
Sunderland District	,, 9	527	507	— 20	6	3,661	— 285
Swindon Corporation	,, 16	150	173	+ 23	33	6.714	+ 464
Torquay	,, 10	382	345	— 37	49	27,147	— 3,801
Trys. (M.E.T.) 'Buses	*	...	...	...	...	...	...
TynesideTrys. & Tmrds.	Dec. 16	476	492	+ 16	25	15,056	+ 2,129
Wallasey Corporation	,, 19	1,009	1,066	— 57	37½	47,901	+ 1,012
Walsall Corporation	,, 19	634	679	+ 45	51	92,033	+ 258
Walthamstow U.D.C.	,, 19	714	735	+ 21	38	30,922	+ 2,611
Warrington Corp.	Nov. 26	457	394	— 63	34	14,975	— 447
West Ham Corporation	Dec. 10	2,649	2,793	+ 144	36	103,148	+ 3,710
Wigan Corporation	,, 17	1,488	1,409	— 79	37	54,355	— 1,719
Wolverhampton Corp	,, 16	1,069	1,022	— 47	38	39,377	— 1,266
Yorkshire (W. Riding)	,, 20	1,240	1,325	+ 85	51	73,547	+ 60

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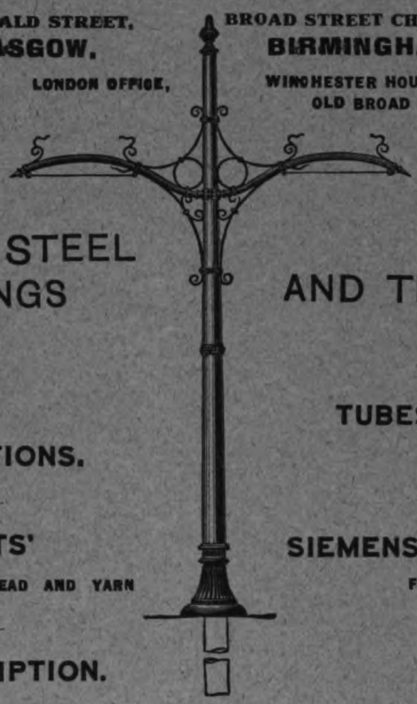

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Particulars are given under the following heads:—

Capital Account:—
Borrowing Powers.
Borrowing Powers Exercised.
Unexhausted Borrowing Powers.
Capital Expenditure per mile of Single Track.
Loans Outstanding.
Sinking Fund and Loans Repaid.
Depreciation, Renewal and Reserve Funds.

Gross Profit on Working.

Working Expenses
Traffic.
General.
Repairs and Maintenance.
Power.
Total.

Gross Receipts:—
Traffic.
Other Revenue.
Total.

Deductions from Gross Profit:—
Interest.
Sinking Fund.
Income Tax.
Depreciation and Renewals.
Sundries.
Total.

Net Surplus or Deficit.

Appropriation of Net Surplus:—
Carried Forward.
Reserve.
Relief of Rates.

Percentage of Operating Expenses To Total Revenue.

Receipts per Car Mile:—
Average Total per Car Mile.
Average Traffic Total per Car Mile.

Operating Expenses per Car Mile:—
Traffic.
General.
Repairs and Maintenance.
Power.
Total.

Average Operating Expenses per Car Mile (excluding Power Cost).

Board of Trade Units —
No. of Units used.
Cost per Unit.
Units used per Car Mile.

Traffic Records:—
Population served.
Car Mileage.
Passengers Carried.
Passengers carried per Car Mile
Average Fare per passenger.
Average Journeys per head of population served per annum.
Average Car Miles per Day per Car.
Traffic Revenue per Mile of Single Track.
Average Traffic Revenue per annum per head of population served
Operating expenses per passenger.
Average distance of 1d. fare.
Average fare charged per mile.
Average speed per hour.
Average Car hours per day.
Average number of Cars in use daily.
Number of cars in stock.

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Telegraphic Addresses and Telephone Numbers

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NAME OF COMPANY OR FIRM.	ADDRESS.	TELEGRAPHIC ADDRESS.	TELEPHONE NO.
Ackley Brake Co.	50, Church Street, New York City, U.S.A.	Acklebrak, New York	—
Ailsa Oilskin & Rubber Co.	Ailsa Works, Dairy, Ayrshire	Ailsa, Dairy, Ayrshire	—
Albion Motor Car Co., Ltd.	Scotstoun, Glasgow, W.	Automobile, Glasgow	1991, Partick, Glasgow.
Allen & Co., Ltd., Edgar	Imperial Steel Works, Tinsley, Sheffield	Allen, Sheffield	917, 268, Sheffield.
Allen & Co., Ltd., Edgar (Tramway Dept.)	Imperial Steel Works, Tinsley, Sheffield	Askham, Sheffield (Tramway and Machinery)	213, Sheffield.
Anger Manufacturing and Supply Co., Ltd.	Bank Chambers, Preston, Lancs.	Brakjuster, Preston	1033, Preston.
Anglo Engraving Co., Ltd.	Milford Lane, Strand, London, W.C.	Operameter, Estrand, London	117, 8, 9, Gerrard.
Armstrong, Stevens & Son, Ltd.	Whittall Street, Birmingham	Armstrongs, Birmingham	6148, Birmingham.
Auto-Ticket Printing Co., Ltd.	41, Wapping, Liverpool	Extension, Liverpool	4646, Bank, Liverpool.
Aveling & Co. (B'ham), Ltd., T. C.	91-3, New Canal Street, Birmingham	Aveling, Birmingham	2939, Birmingham.
Avon India Rubber Co., Ltd.	Melksham, Wilts	Rubber, Melksham	2, Melksham.
Babcock & Wilcox, Ltd.	80, Farringdon Street, London, E.C.	Babcock, London	6470 City (8 lines).
Baker & Co. (Rotherham), Ltd., J.	Brinsworth Iron and Wheel Works, Rotherham	Brinsworth, Rotherham	39 and 435, Rotherham.
Bayliss, Jones & Bayliss, Ltd.	Victoria Works, Monmore Green, Wolverhampton	Bayliss, Wolverhampton	630, Wolverhampton.
Belliss & Morcom, Ltd.	Ledsam Street Works, Birmingham	Belliss, Birmingham	3044, Birmingham.
Bell Punch & Printing Co., Ltd.	53-58, Tabernacle Street, London, E.C.	Oamic, Finsquare, London	7531, Central.
Bentinck Motor Supply Co., Ltd.	13, Spring Gardens, Manchester	—	—
Bridgeport Brass Co.	Broadway and Murray Street, New York, U.S.A.	—	—
Brill Co., J. G.	110, Cannon Street, London, E.C.	Axles, London	6018, Bank.
British Ackley Brake and Supply Co., Ltd.	Westinghouse Building, Norfolk Street, London, W.C.	Acklebrusa, Estrand, London	8273, Gerrard.
British Aluminium Co., Ltd.	109, Queen Victoria Street, London, E.C.	Cryolite, London	2876, City (3 lines).
British Berna Motor Lorries, Ltd.	Avonmore Road, West Kensington, London, W.	Kilbergar, Westkens, London	4543, Western.
British Insulated & Helsby Cables, Ltd.	Prescot, Lancs	Insulator, Prescot	8, Prescot.
British Westinghouse Electric & Mfg. Co., Ltd.	Westinghouse Building, Norfolk Street, London, W.C.	Multiphase, Estrand, London	3961 & 2476, Gerrard.
Brockhouse & Co., Ltd.	Victoria Works, Hill Top, West Bromwich	Brookhouse, West Bromwich	228, West Bromwich.
Brown and Sons (Huddersfield), Ltd., David	Park Works, Lockwood, Huddersfield	Gearing, Huddersfield	1080, Huddersfield.
Brush Electrical Engineering Co., Ltd.	Falcon Works, Loughborough	Falcon, Loughborough	624, Loughborough.
"Cedes" Electric Traction, Ltd.	112, Great Portland Street, London, W.	Cedesmixte, Wesdo, London	6130 Mayfair.
Clay & Atkinson	Bower Street, Bradford	—	1263, Bradford.
Clayton & Co. (Huddersfield), Ltd.	Union Works, Huddersfield	Karriakar, Huddersfield	1441, 2, 3, Huddersfield.
Clough, Smith & Co., Ltd.	Spencer House, South Place, London, E.C.	Clufmit, Ave., London	8150, City.
Commercial Cars, Ltd.	Biscot Road, Luton	Komerkars, Luton	192 and 193, Luton.
Consolidated Accessories Co.	27, Clement's Lane, London, E.C.	Inbrake, Cannon, London	8735, Central.
Continental Tyre and Rubber Co., Ltd.	Thurloe Place, London, S.W.	Pneumique, Southkens, Ldn	4340, Kensington.
Courtenay, J. W., Ltd.	Amberley House, Norfolk Street, W.C.	Tramigro, London	3948, Gerrard.
Curzon, Stuart A.	98-100, Victoria Street, London, S.W.	Curcarsold, Sowest, London	7843, Victoria.
Daimler Co., Ltd.	Daimler Works, Coventry	Daimler, Coventry	505, Coventry.
Dennis & Co., W. F.	49, Queen Victoria Street, London, E.C.	Fredennis, Cannon, London	343, Bank (2 lines).
Dennis Bros. (1913), Ltd.	Onslow Works, Guildford	Dennis, Guildford	129 and 339, Guildford.
Dick, Kerr & Co., Ltd.	Abchurch Yard, Cannon Street, E.C.	Dicker, Cannon, London	5866, Bank (4 lines).
Docker Brothers, Ltd.	170, Bishopsgate, London, E.C.	Matured, London	2775, London Wall.
Doulton & Co., Ltd.	Lambeth Pottery, Lambeth, S.E.	Doulton, London	2290, Victoria (5 lines).
Dryers, Ltd.	53, Victoria Buildings, Manchester	Brownish, Manchester	5836, City.
Dunlop Rubber Co., Ltd.	Manor Mills, Aston, Birmingham	Elastic, Birmingham	123, East, Birmingham.

(Continued on page iv.)

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NAME OF COMPANY OR FIRM.	ADDRESS.	TELEGRAPHIC ADDRESS.	TELEPHONE NO.
Edison & Swan United Electric Light Co., Ltd.	Ponders End, Middlesex	Ediswan, Ponders End	520, Enfield. [Central
Electric Construction Co., Ltd.	Dashwood House, 9, New Broad Street, E.C.	Concordance, London	2671, London Wall, and 10999
Electro-Mechanical Brake Co., Ltd.	Eagle Works, West Bromwich	Brakes, West Bromwich	291, West Bromwich.
Equipment & Engineering Co.	Westinghouse Building, Norfolk Street, London, W.C.	Kharparts, Estrand, London	3972, Gerrard.
Estler Bros.	South Molton Road, Victoria Docks, London, E.	Isolable, London	330, East.
Felten & Guilleaume, Carlswerk, A. G.	Cöln-Mülheim, Germany	Carlswerk, Cöln	——
Ferranti, Ltd.	Central House, Kingsway, London, W.C.	Ferranti, Westcent, London	1602, Regent.
General Electric Co., Ltd.	71, Queen Victoria Street, London, E.C.	Polyphase, London	3600, London Wall.
General Seating Co., Ltd.	13, City Road, London, E.C.	Cushioning, Finsquare, Lndn.	6187, London Wall.
Glasgow Numerical Printing Co.	31, Finnieston Street, Glasgow	Tickets, Glasgow	5350, Glasgow
Glenn, J. Barber	Moorgate Station Chambers, London, E.C.	Octet, Ave., London	362, London Wall.
Green & Sons, Ltd., E.	2, Exchange Street, Manchester	Economiser, Manchester	1375, Manchester.
Grover & Co., Ltd.	St. Peter's Street, Wharf Road, City Road, N.	Adopted, Nordo, London	617, North.
Hadfields, Ltd.	Hecla Works, Sheffield	Hadfield, Sheffield	750, 2628, & 2688, Sheffield.
Halley's Industrial Motors, Ltd.	Yoker, Glasgow	Horseless, Glasgow	196 & 197, Clydebank.
Henley's Telegraph Works, Ltd.	13 & 14, Blomfield Street, London Wall, E.C.	Henletel, Ave., London	4560, London Wall.
Hurst, Nelson & Co., Ltd.	Motherwell, Scotland	Nelson, Motherwell	44, Motherwell.
International Pay-as-you-enter Tram. Co., Ltd.	117, Victoria Street, London, S.W.	Pasentecar, London	6512, Victoria.
International Time Recording Co.	151-155, City Road, London, E.C.	Timefactos, London	1629, London Wall.
Kearsley & Co., Ltd., Robt.	Ripon, Yorks	Kearsley, Ripon	5, Ripon.
Leyland Motors, Ltd.	Leyland, Lancs	Motors, Leyland	37, Leyland.
Lorain Steel Co.	36-38, New Broad Street, London, E.C.	Thoughtful, London	6186, London Wall.
Macintosh & Co., Ltd., Chas.	Cambridge Street, Manchester	Macintosh, Manchester	7147, Central, Manchester.
M. and G. Truck and Engineering Co., Ltd.	84, John's House, 124-127, Minories, London, E.	Emgeestock, Ald., London	729, Avenue.
Magnolia Anti-Friction Metal Co., Ltd.	49, Queen Victoria Street, London, E.C.	Magnolier, Cannon, London	6596, City.
Major, Robinson & Co., Ltd.	218, Deansgate, Manchester		5008, Central, Manchester.
Maudslay Motor Co., Ltd.	Parkside, Coventry	Maudslay, Coventry	110, Coventry.
Metropolitan Carriage, Wagon, and Finance Co., Ltd.	Saltley, Birmingham	Metro., Birmingham	6410, Central.
Micanite & Insulators Co., Ltd.	Empire Works, Blackhorse Lane, Walthamstow, E.	Mytilite, Phone, London	32, Walthamstow.
Millars' Timber and Trading Co., Ltd.	Pinners' Hall, London, E.C.	Jarrah, Stock, London	366, London Wall.
Milnes-Daimler-Mercedes, Ltd.	123, Long Acre, London, W.C.	Milnesie, Rand, London	6910, Gerrard.
Mirrlees, Watson Co., Ltd.	Scotland Street, Glasgow	Mirrlees, Glasgow	1781, South Side.
Motor Rail and Tram Car Co., Ltd.	79 Lombard Street, London, E.C.	——	1777, Avenue.
Motor Traction	20, Tudor Street, London, E.C.	Autocars, Fleet, London	2848, City.
Municipal Tramways Association	C. J. Spencer, 7, Hall Ings, Bradford	Tramways, Bradford	2381 & 2382, Bradford.
National Electric Construction Co., Ltd.	3, Laurence Pountney Hill, London, E.C.	Overhauled, London	5329, Bank.
Naylor Brothers (London) Ltd.	407, Oxford Street, London, W	Glossiest, Wesdo, London	926, Paddington.
Peacock Brake Co.	27, Clement's Lane, London, E.C.	Inbrake, Cannon, London	5735, Central.
Pease & Partners, Ltd.	Tees Ironworks, Middlesbrough	Pease, Middlesbrough	917, Middlesbrough.
Peckham Truck Co.	Queen Anne's Chambers, London, S.W.	Peckham, Quanoham, London	2413, Victoria.
Peter Union Tyre Co.	120-123, Great Portland Street, London, W.	Pneupeter, Wesdo, London	2433, Gerrard.
Philipson & Co., W.	Holland Street, Astley Bridge, Bolton	Safety, Bolton	147, Eagley.
Pinchin, Johnson & Co., Ltd.	Minerva House, 26 & 27, Bevis Marks, London, E.C.	Pinchin, Ald., London	9916, London Wall.
Polack Tyre and Rubber Co., Ltd.	31-34, Basinghall Street, London, E.C.	Polackomp Ave., London	5726, London Wall.
R.E.T. Construction Co., Ltd.	Finsbury Pavement House, London, E.C.	Railleasly, Ave., London	1384, London Wall.
Railway & General Engineering Co., Ltd.	Meadow Works, Nottingham	Dot, Nottingham	19, Nottingham.
Railway Track Supply Co. of Gt. Britain	79½, Gracechurch Street, London, E.C.	Gillfraze, London	930, Bank.
Ruberoid Co., Ltd.	81-83, Knightrider Street, London, E.C.	Ruberoid, Cent., London	1480, Central.
Russell & Sons, Ltd., James	Crown Tube Works, Wednesbury	Russell, Wednesbury	2, Wednesbury.
Scholey & Co., Ltd.	151, Queen Victoria Street, London, E.W.	Scolanco, London	5863, City.
Shrewsbury & Challiner Tyre Co., Ltd.	Kay Street, Ardwick Green, Manchester	Challiner, Manchester	962, Central, Manchester.
Siemens Brothers Dynamo Works, Ltd.	Tyssen Street, Dalston, London, N.E.	Siemodyn, Kinland, London	8387-8389, Central, and 2440, Dalston
Simplex Conduits, Ltd.	Garrison Lane, Birmingham	Economy, Birmingham	35, Victoria, Birmingham.
Simplex Rubber Co., Ltd.	Scrubbs Lane, Willesden, London, N.W.	Simplexine, Kensal, London	550, Willesden.
Skefko Ball Bearing Co., Ltd.	Skefko Works, Luton	Skefko, Luton	418, Luton.
Smith & Co., Frederick	Anaconda Works, Salford, Manchester	Anaconda, Manchester	2334, Manchester.
Standard Underground Cable Co.	Dock House, Billiter Street, London, E.C.	——	5463, Avenue.
Stevens, Ltd., W. A.	26, Victoria Street, London, S.W.	Petelobus, Vic., London	4089, Victoria.
Stewarts & Lloyds, Ltd.	41, Oswald Street, Glasgow	Lapweld, Glasgow	9860, City.
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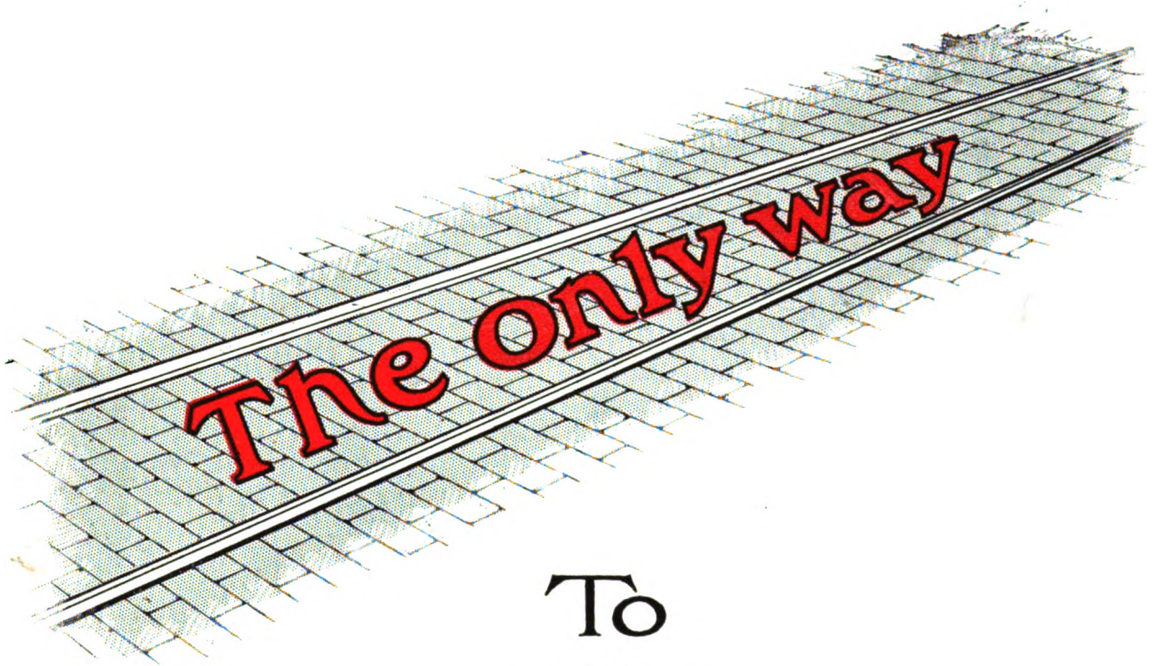

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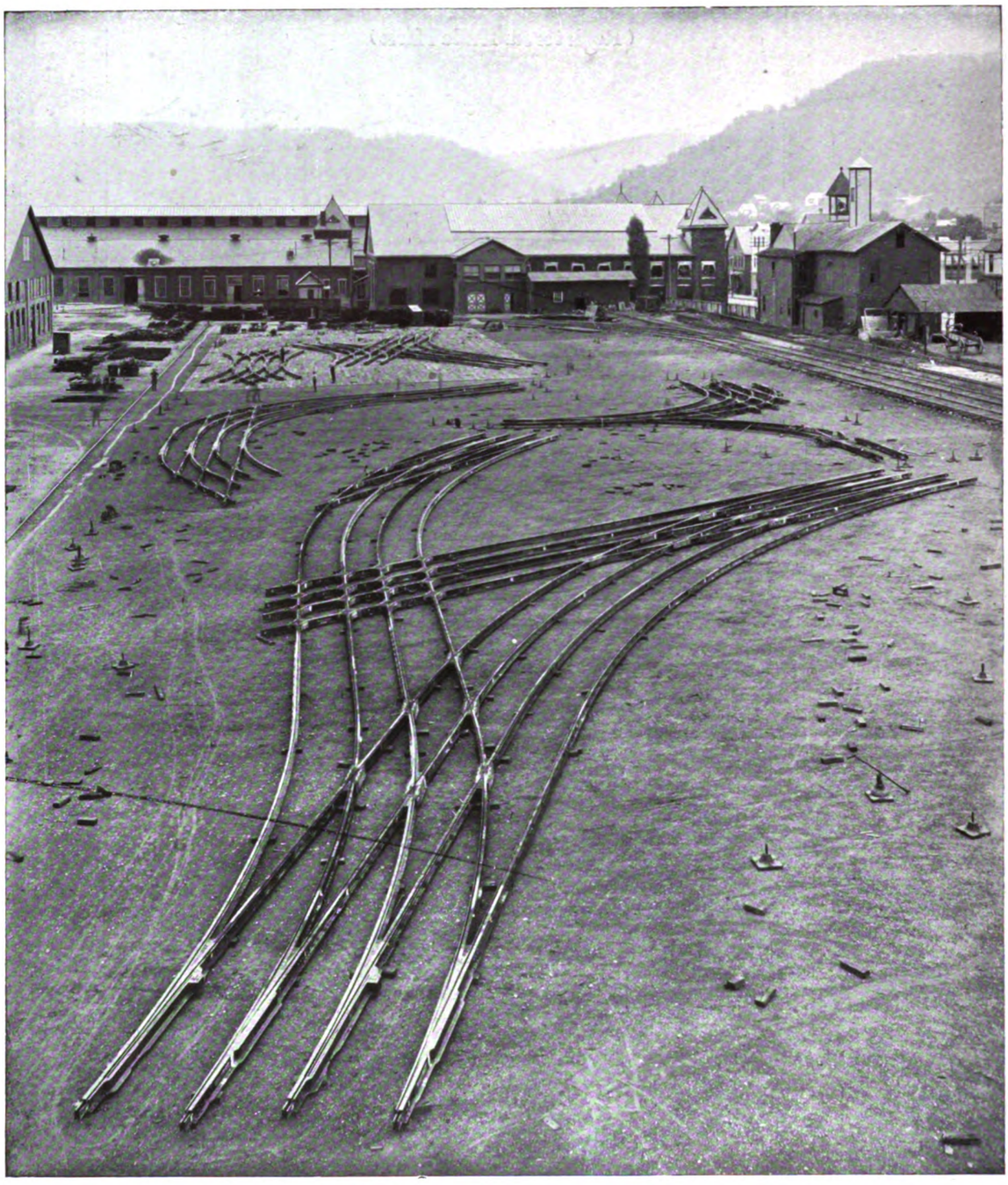

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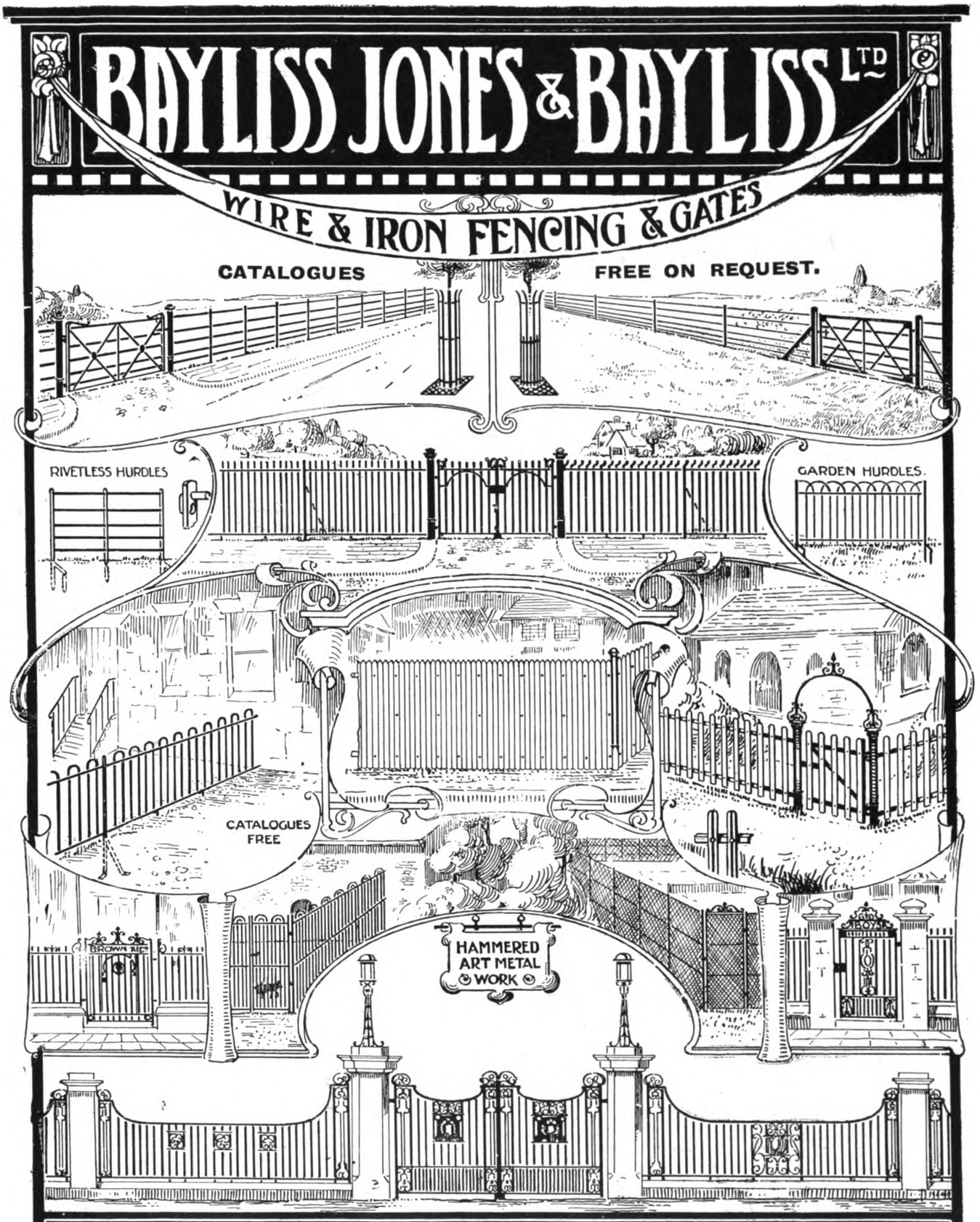

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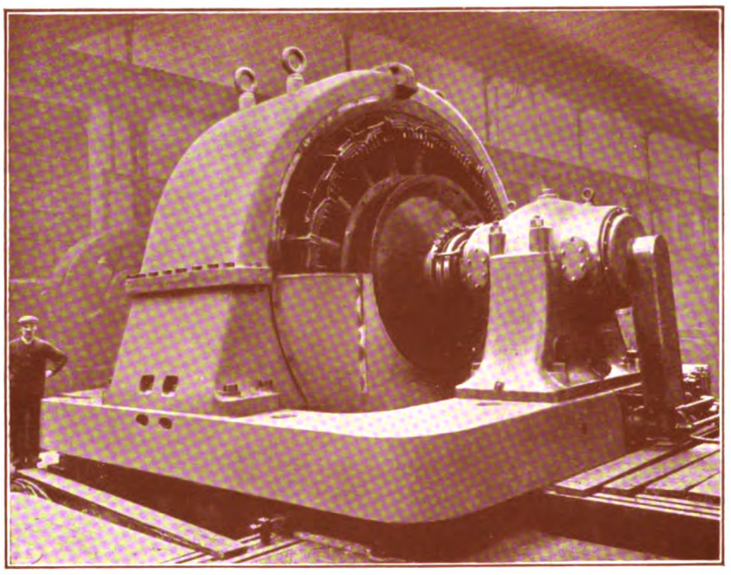

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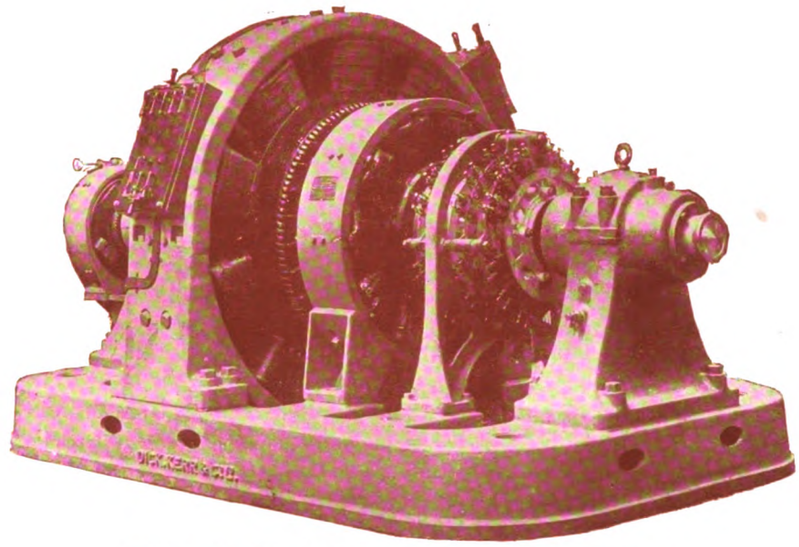

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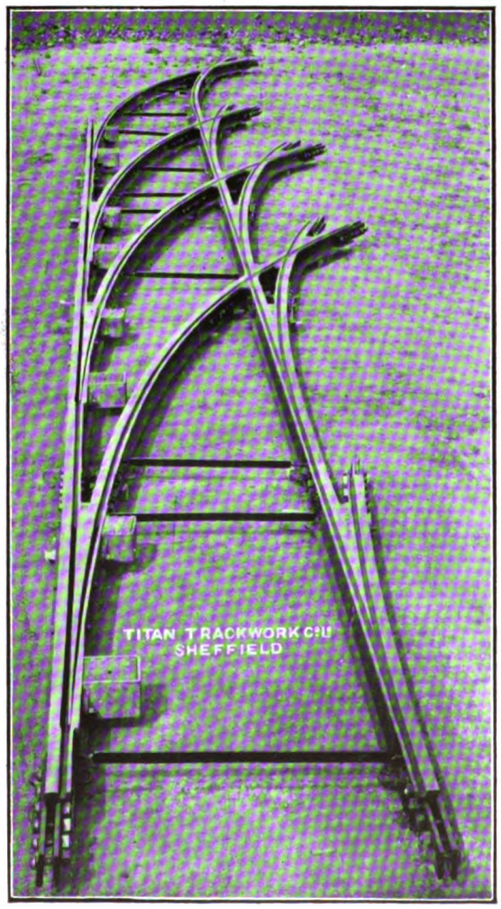

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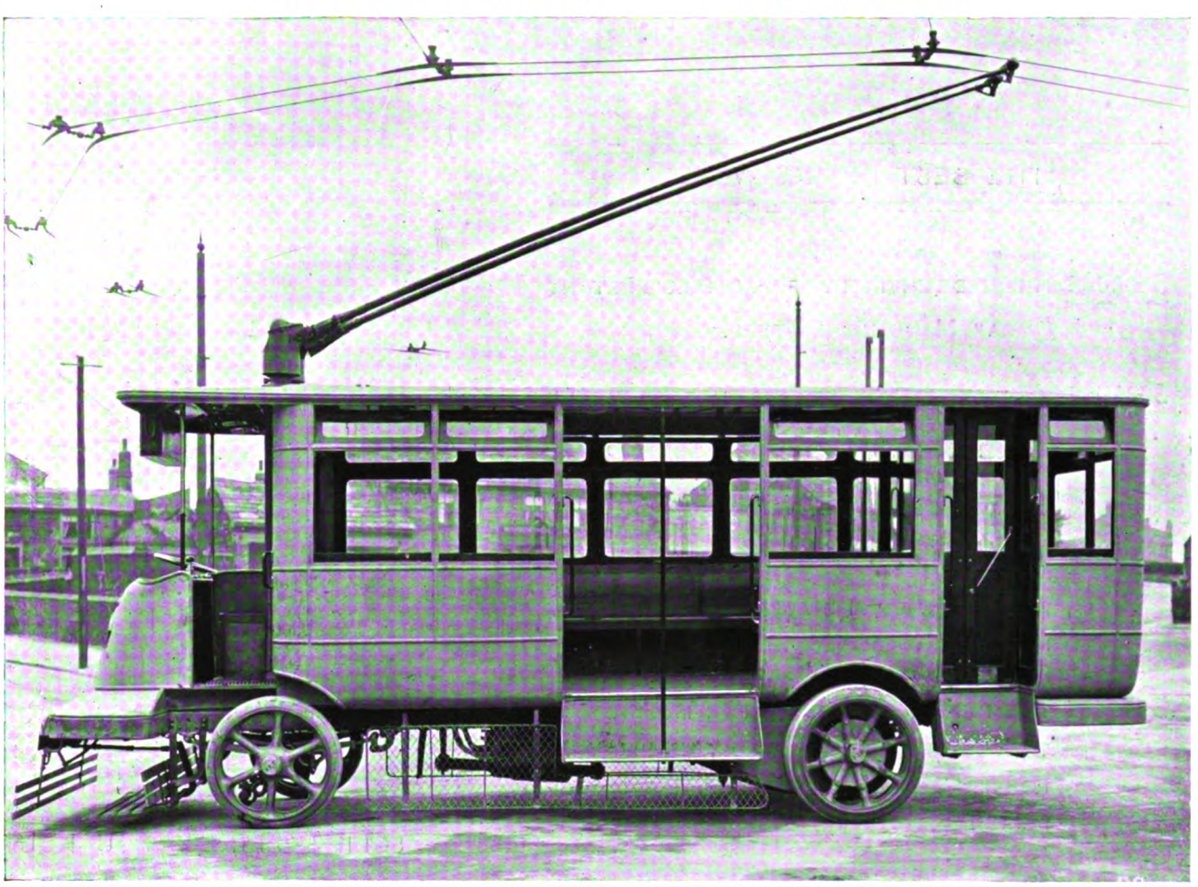

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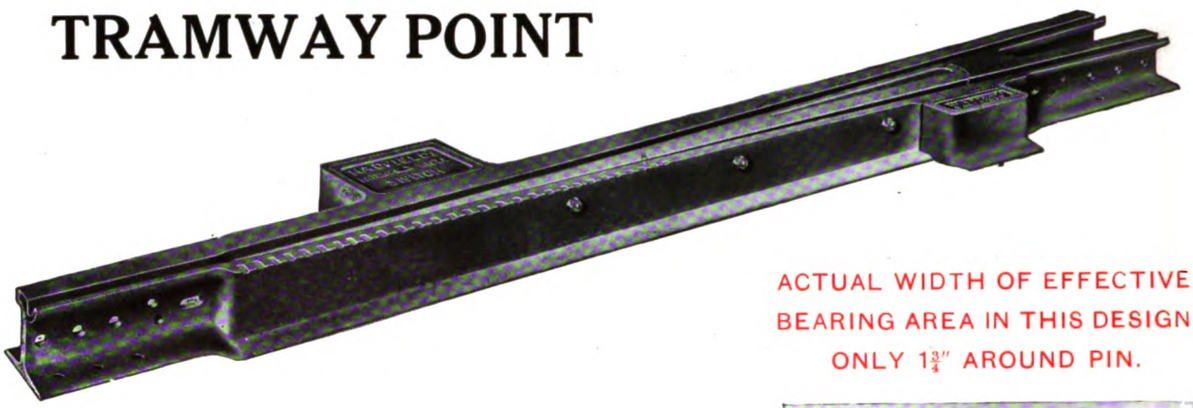

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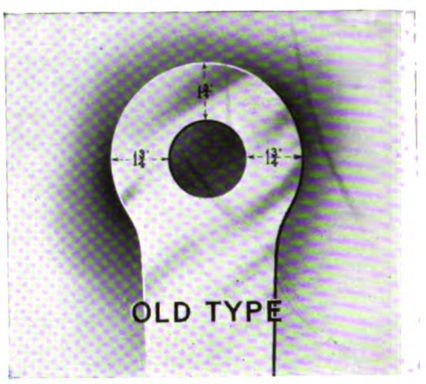

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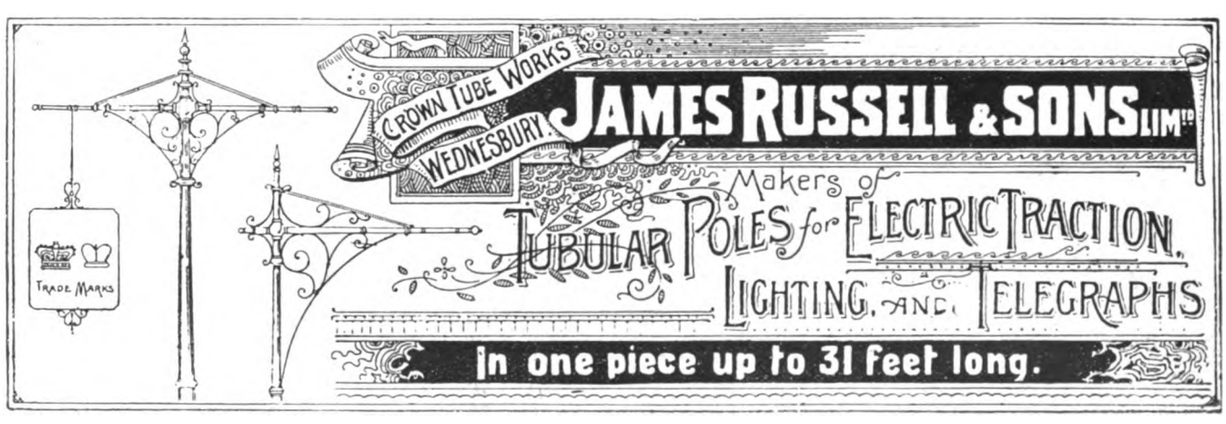

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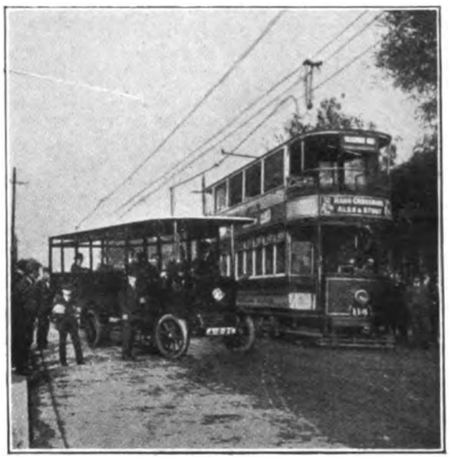

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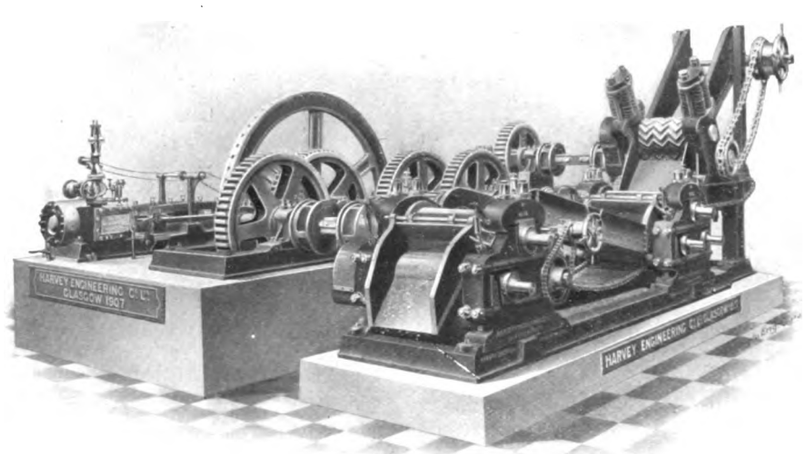

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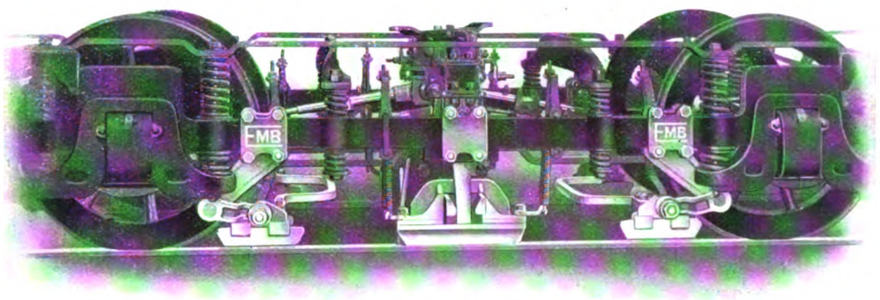

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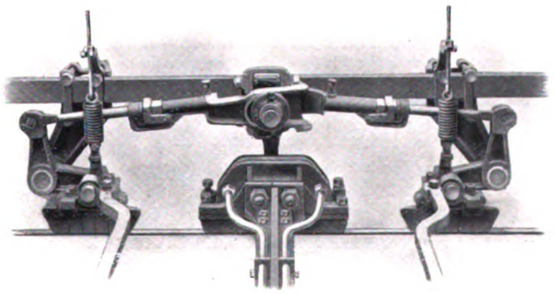

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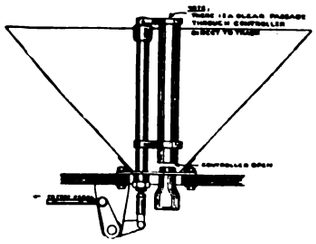

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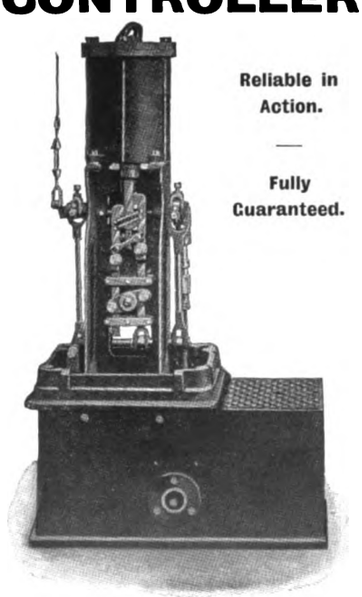

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(Continued on page xx.)

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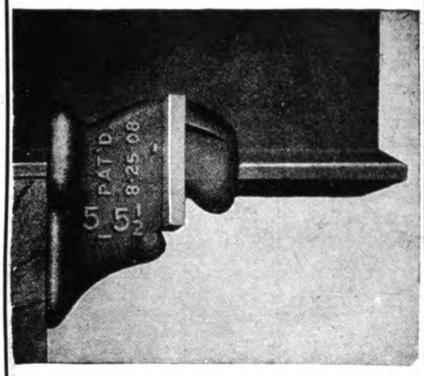

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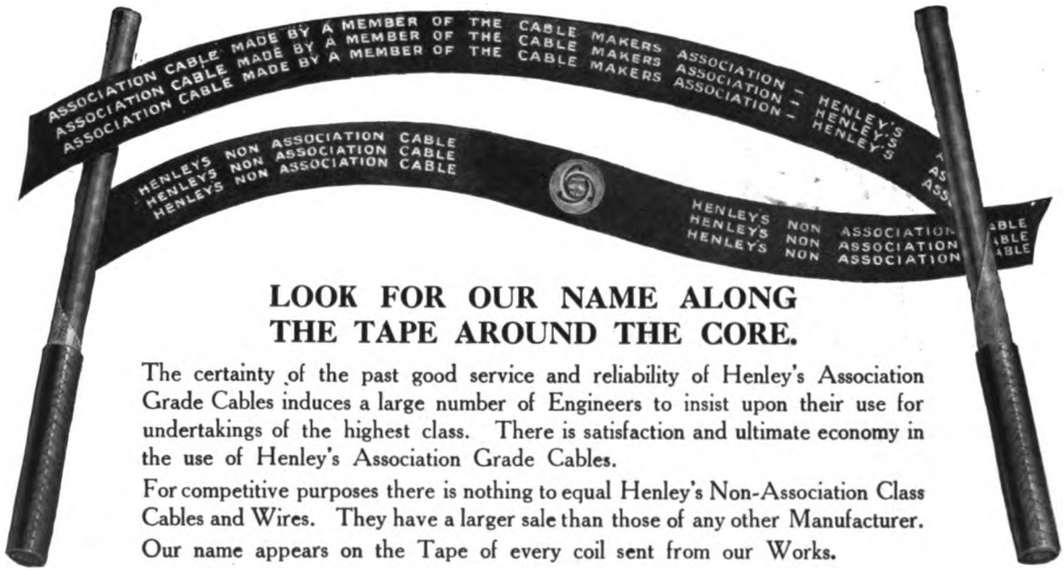

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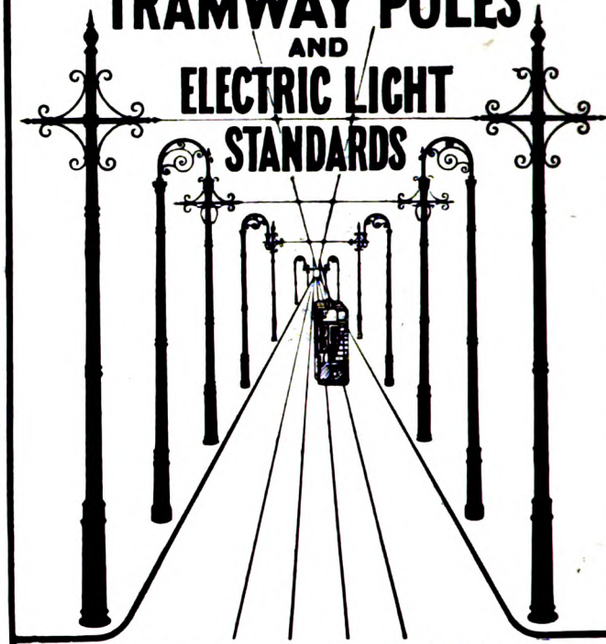

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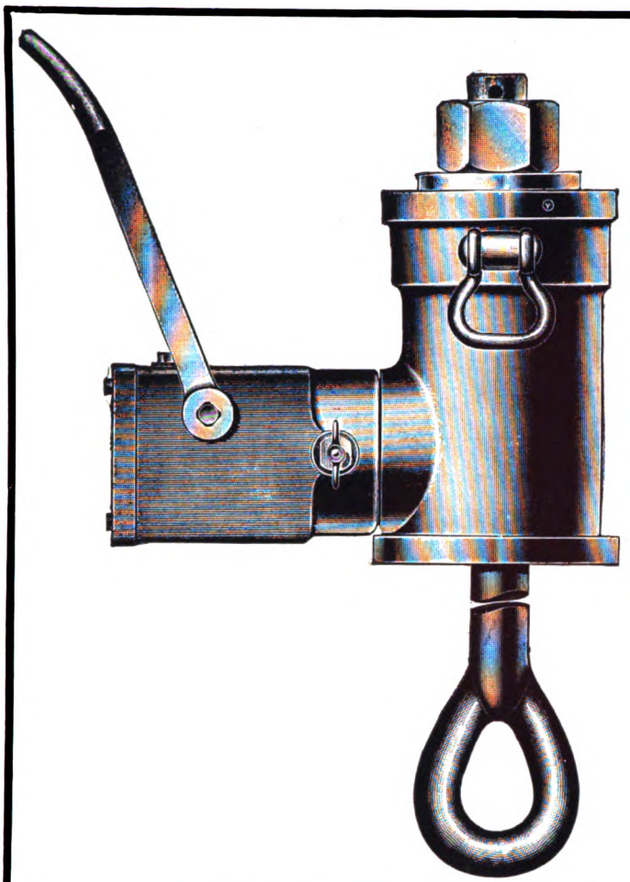

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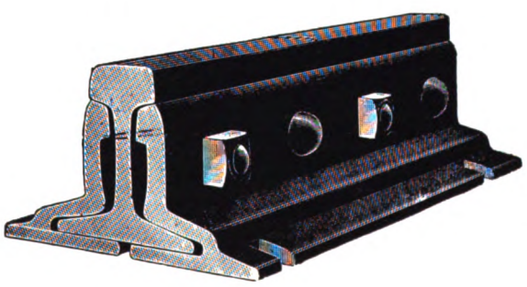

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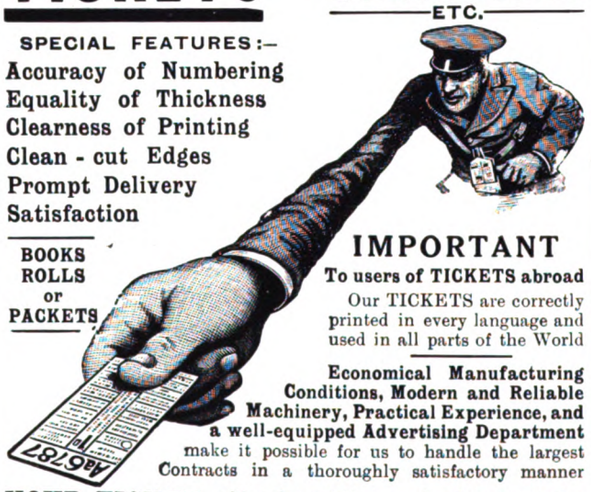

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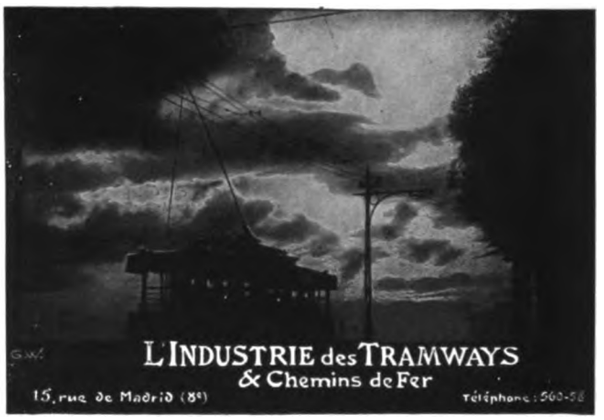

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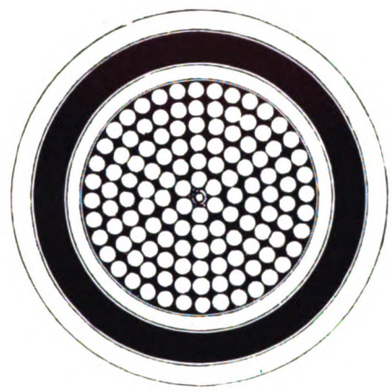

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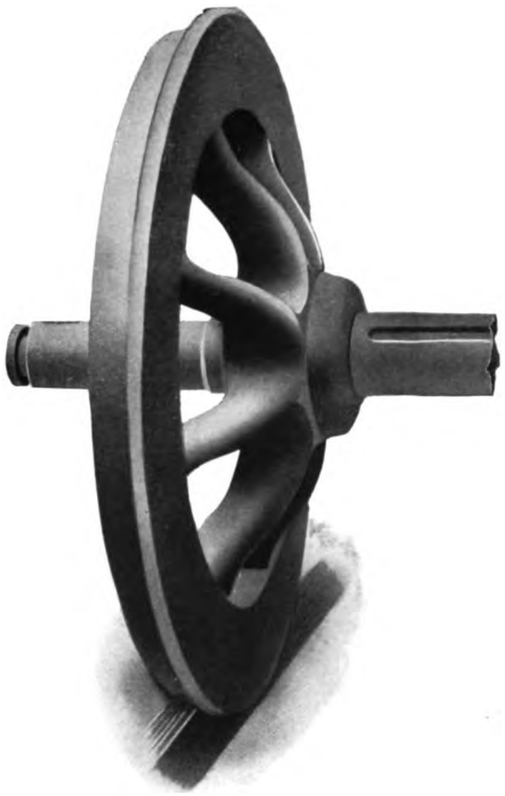

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Aberdare Urban District Tramways, Gadlys Estate, Aberdare. [T.A., Tramways, Aberdare: T.N., 17.] *Gen. Manager and Elec. Engineer*, A. J. Abraham; *Traffic Manager*, H. King; *Chairman Try. Com.*, Coun. E. M. Hann.

Aberdeen Corporation Tramways, Municipal Buildings, Union Street, Aberdeen. [T.A., Trams, Aberdeen; T.N. 826.] *Gen. Manager and Eng.*, R. S. Pilcher; *Per. Way Eng.*, Wm. Dyack; *Chairman Try. Com.*, Coun. J. A. Smith.

Accrington Corporation Tramways, Market Hall, Accrington. [T.A., Trams, Accrington; T.N., 212.] *Gen. Manager and Eng.*, H. Pilling; *Per. Way Eng.*, W. J. Newton; *Chairman Try. Com.*, Ald. T. E. Higham; *Vice-Chairman*, Coun. Morley.

Ashton-under-Lyne Corporation Tramways, Tramway Depot, Mossley Road, Ashton. [T.A., Tramways, Ashton; T.N., 325.] *Gen. Manager*, Ernest Holt; *Elec. Eng.*, N. Appelbee; *Chairman Try. Com.*, Coun. R. S. Oldham; *Vice-Chairman*, Coun. Waterhouse.

Aston Manor Corporation Tramways, Council House, Aston Manor. *Consulting Eng.*, Robert Green; *Town Clerk*, J. Ansell; *Chairman Try. Com.*, Ald. W. Evans, J.P.

[Lines leased to City of Birmingham Tramways Co., *q.v.*]

Ayr Corporation Tramways, Town Building, Ayr. [T.A., Trams, Ayr; T.N., 123.] *Gen. Manager and Eng.*, William Grant; *Burgh Elec. Eng.*, R. Marshall; *Per. Way Eng.*, John Young; *Rolling Stock Supt.*, Alf. Somerville; *Convener Try. Com.*, Police-Judge P. S. Ferguson; *Vice-Chairman*, Bailie Gould.

Bacup Corporation Tramways.—Town Hall, Bacup, Lancs. *Town Clerk*, J. Entwistle; *Boro' Eng.*, W. H. Elce; *Chairman Try. Com.*, Ald. J. H. Maden; *Vice-Chairman*, Ald. J. Craven Hoyle.

Barking Town Urban District Tramways, East Street, Barking. [T.N., 156 Barking.] *Manager and Elec. Eng.*, W. Holmes; *Chairman Try. Com.*, Coun. A. E. Martin.

Barton-upon-Irwell District Council Light Railways, Barton-upon-Irwell.

[Line leased to and worked by the Lancashire United Tramways Co., *q.v.*]

Batley Corporation Tramways, Batley, Yorks. *Engineer*, S. D. Jones; *Chairman Try. Com.*, Coun. J. W. Turner; *Vice-Chairman*, Coun. W. A. Parker.

[Lines leased to and worked by the Yorkshire (Woollen District) Electric Tramways, Ltd., *q.v.*]

Belfast City Tramways, Tramways Office, Sandy Row, Belfast. [T.A., Nance, Tramway, Belfast; T.N., 2444.] *Gen. Manager*, Andrew Nance; *Traffic Manager*, R. McMaster; *City Elec. Eng.*, T. W. Bloxam; *Per. Way Eng.*, E. S. Pinkerton; *Chief Eng.*, A. A. Blackburn; *Chairman Try. Com.*, Ald. Sir Robert Anderson, Bart., D.L., J.P.; *Vice-Chairman*, Ald. J. S. Finnigan.

Bexley Urban District Council Tramways, Car Sheds, Bexleyheath, Kent. [T.A., Stokes, Bexleyheath; T.N., 79.] *Gen. Manager and Elec. Eng.*, H. P. Stokes; *Rolling Stock Supt.*, A. Williams; *Chairman Try. Com.*, Coun. T. Rattenbury; *Vice-Chairman*, Coun. E. F. Reid.

Birkenhead Corporation Tramways, Laird Street, Birkenhead. [T.A., Tramways Manager, Birkenhead; T.N., 1110.] *Gen. Manager*, C. Clarke; *Borough Sur. and Eng.*, C. Brownridge; *Rolling Stock Supt.*, R. Chadwick; *Chairman Try. Com.*, Coun. H. Halsall; *Vice-Chairman*, ——

Birmingham Corporation Tramways, The Council House, Congreve Street, Birmingham. [T.N., 4609.] *Gen. Manager*, A. Baker; *City Elec. Eng.*, R. A. Chattock; *Traffic Supt.*, J. McDonnell; *Per. Way Eng.*, C. E. S. Bill; *Rolling Stock Supt.*, R. H. Dickinson; *Chairman Try. Com.*, Coun. H. Barrow, J.P.

Blackburn Corporation Tramways, 2, Salford, Blackburn. [T.A., Tramways, Blackburn; T.N., 547.] *General Manager*, J. H. Cowell; *Elec. Eng.*, P. P. Wheelwright; *Traffic Manager*, E. Greek; *Car Shed Supt.*, H. W. Seymour; *Chairman Try. Com.*, Ald. W. Thompson; *Vice-Chairman*, Ald. Nuttall.

Blackpool Corporation Tramways, West Caroline Street, Blackpool. [T.N., 67.] *Gen. Manager*, C. Furness; *Traffic Supt.*, C. J. Baker; *Resident Eng.*, F. Field; *Chairman Try. Com.*, Ald. J. Brodie, J.P.; *Vice-Chairman*, Coun. Holt.

Bolton Corporation Tramways, Bradshawgate, Bolton. [T.A., Manager, Tramways, Bolton; T.N., 490.] *General Manager*, J. Barnard; *Elec. Eng.*, W. J. H. Wood; *Per. Way Eng.*, E. Ll. Morgan; *Rolling Stock Supt.*, F. Taylor; *Chairman Try. Com.*, Ald. J. Miles; *Vice-Chairman*, Coun. P. Higson.

Bootle Corporation Tramways, Electricity Works, Pine Grove, Bootle. [T.N., 424.] *Elec. Eng.*, T. D. Clothier; *Chairman Try. Com.*, Coun. Booth; *Vice-Chairman*, Coun. Pennington.

[Lines worked by Liverpool Corporation Tramways.]

Bournemouth Corporation Tramways, Tramways Offices, Lansdowne Crescent, Bournemouth [T.A., Tramways, Bournemouth; T.N., 1701.] *General Manager*, I. Bulfin; *Chief Assistant & Elec. Eng.*, H. Vickers; *Traffic Supt.*, R. O. Baldwin; *Chairman Try. Com.*, Coun. A. Davis; *Vice-Chairman*, Coun. R. F. Godfrey.

Bradford Corporation Tramways, Central Office, 7, Hall Ings, Bradford. [T.A., Tramways, Bradford; T.N., 2381 and 2382.] *Gen. Manager*, C. J. Spencer; *Asst. Elec. Eng.*, J. W. Dawson; *Traffic Supt.*, T. Stirk; *City Elec. Eng.*, T. Roles; *Chairman Try. Com.*, Coun. Enoch Priestley; *Vice-Chairman*, Coun. S. C. T. Neumann.

Brighton Corporation Tramways, Lewes Road, Brighton. [T.A., Tramways, Brighton; T.N., 353 P.O.] *Eng. & Manager*, William Marsh; *Traffic Supt.*, W. N. Brooks; *Rolling Stock Supt.*, W. Orchard; *Per. Way Eng.*, F. N. Hudson; *Chairman Try. Com.*, Ald. F. T. Wilson.

Burnley Corporation Tramways, Queen's Gate, Burnley. [T.N., 46.] *Gen. Manager*, Henry Mozley; *Boro. Elec. Eng.*, J. E. Starkie; *Boro. Surveyor*, G. H. Pickles; *Chairman Try. Com.*, Coun. E. Heap; *Vice-Chairman*, Coun. Irving.

Burton-on-Trent Corporation Tramways, Guild Street, Burton-on-Trent. [T.N., 202.] *Manager*, A. B. Slater; *Engineer*, T. Hall; *Chairman Try. Com.*, Ald. J. S. Rowland; *Vice-Chairman*, Ald. T. E. Lowe.

Bury Corporation Tramways, Market Place, Bury. [T.N., 26.] *Gen. Manager*, William Clough; *Boro. Elec. Eng.*, S. J. Watson; *Chairman Try. Com.*, Ald. T. S. Collinge; *Vice-Chairman*, Coun. Hargreaves.

Cardiff Corporation Tramways, Central Offices, The Hayes, Cardiff. [T.A., Tramways, Cardiff; T.N., 1211, 1240, 1350, 1378, and 1379.] *Gen. Manager and Elec. Eng.*, A. Ellis; *Traffic Manager*, H. David; *Per. Way Eng.*, W. Harpur; *Rolling Stock Supt.*, Jas. Preston; *Chairman Try. Com.*, Ald. Sir J. W. Courtis, J.P.; *Vice-Chairman*, Coun. A. J. A. Stone.

Chester Corporation Tramways, Station Road, Chester. [T.N., 166.] *Manager*, J. Gardner; *Elec. Eng.*, S. E. Britton; *Per. Way Eng.*, W. M. Jones; *Chairman Try. Com.*, Ald. J. Jones; *Vice-Chairman*, Coun. J. Dodd.

Chesterfield Corporation Tramways, Chatsworth Road, Chesterfield. [T.A., Tramways, Chesterfield; T.N., 78.] *Gen. Manager and Elec. Eng.*, R. L. Acland; *Traffic Manager*, F. Root; *Per. Way Eng.*, C. E. Crossley; *Chairman Try. Com.*, Ald. E. Shentall.

Colchester Corporation Tramways, Magdalen Street, Colchester. [T.A., Tramways, Colchester; T.N., 92.] *Gen. Manager and Engineer*, R. C. Bullough; *Chairman Try. Com.*, Coun. A. M. Jarmin; *Vice-Chairman*, Coun. J. T. Bailey.

Colne Corporation Tramways, Colne, Lancashire. *General Manager*, T. G. Richardson.

Coventry Corporation Tramways, Priestley's Bridge, Coventry. [T.A., Tramways, Coventry; T.N., 1014.] *Engineer and General Manager*, T. R. Whitehead; *Electrical Engineer*, W. M. Milnes; *Chairman*, Coun. M. K. Pridmore; *Vice-Chairman*, Coun. Pugh.

Croydon Corporation Tramways, Tramways Office, Thornton Heath, Surrey. [T.N., 406, Croydon.] *Tramways Manager*, T. B. Goodyer; *Chairman Try. Com.*, Ald. G. J. Allen; *Vice-Chairman*, Coun. J. O. Pelton.

Darlington Corporation Tramways, Haughton Road, Darlington. [T.A., Tramways, Darlington; T.N., 135.] *General Manager and Elec. Eng.*, J. R. P. Lunn; *Traffic Manager*, G. A. Baxter; *Chairman Try. Com.*, Councillor T. E. B. Bates.

Dartford Urban District Council Tramways, Dartford. *Chairman Try. Com.*, Coun. S. K. Keyes; *Vice-Chairman*, Coun. R. Bennett.

[Leased. See Dartford Tramways in list of Tramway Companies.]

Darwen Corporation Tramways, Lorne Street, Darwen. [T.N., 104.] *Gen. Manager and Eng.*, F. J. S. Hosken; *Boro. Elec. Eng.*, C. H. Garnett; *Boro. Surveyor and Eng.*, R. W. Smith-Saville; *Chairman Try. Com.*, Ald. Jas. Tomlinson; *Vice-Chairman*, Coun. G. P. Holden.

Derby Corporation Tramways, 4, Victoria Street, Derby. [T.N., 410.] *Gen. Manager*, F. Harding; *Elec. Eng.*, T. P. Wilmshurst; *Per. Way Eng.*, J. Ward; *Chairman Try. Com.*, Ald. R. W. Spriggs; *Vice-Chairman*, Coun. J. Dean.

Doncaster Corporation Tramways, Grey Friar's Road, Doncaster. [T.A., Rayner, Doncaster, T.N., 43.] *Manager & Elec. Eng.*, E. S. Rayner; *Chairman Try. Com.*, Coun. P. Stirling (Mayor); *Vice-Chairman*, Coun. Balmforth.

Dover Corporation Tramways, Town Hall, Dover. [T.A., Trams, Dover; T.N., 219 D.] *Gen. Manager*, E. Carden; *Per. Way Eng.*, W. C. Hawke (Boro. Surveyor); *Chairman Try. Com.*, Coun. E. E. Chitty; *Vice-Chairman*, Coun. Barwick.

Dundee Corporation Tramways, Town House Buildings, Dundee. [T.N., 1340]; *Gen. Manager and Eng.*, Peter Fisher; *Elec. Eng.*, H. Richardson; *City Eng.*, J. Thomson; *Chairman Try. Com.*, Coun. G. A. Johnston.

East Ham (Borough of) Corporation Tramways, Nelson Street, East Ham. [T.N., 611 and 100 East Ham.] *Gen. Manager and Elec. Eng.*, W. C. Ullmann; *Chairman Try. Com.*, Coun. T. H. Cowper.

Eccles Corporation Tramways, Eccles. *Elec. Eng.*, H. W. Angus; *Per. Way Eng.*, T. S. Picton; *Chairman Try. Com.*, Ald. W. J. Nuttall, J.P.; *Vice-Chairman*, Coun. A. Crummock.

[Lines worked by Salford Corporation.]

Erith Urban District Council Tramways, Tramway Depôt, Walnut Tree Road, Erith. [T.A., Tramways, Erith; T.N., 36.] *Gen. Manager and Elec. Engineer*, A. Coveney; *Cons. Engs.*, Hawtayne and Zeden; *Chairman Try. Com.*, Coun. G. C. Humphreys.

Exeter Corporation Tramways, Paris Street, Exeter. *Manager*, H. C. Bartlett; *Elec. Eng.* H. D. Munro; *Per. Way Eng.*, T. Moulding; *Chairman Try. Com.*, Coun. T. Linscott; *Vice-Chairman*, Ald. H. B. Varwell.

Farnworth Urban District Council Tramways, Albert Road, Farnworth. *Chairman Try. Com.*, Coun. W. B. Richardson.

[Lines leased to the South Lancashire Tramways Co.]

Glasgow Corporation Tramways, 46, Bath Street, Glasgow. [T.A., Trams, Glasgow; T.N., Post Office 2213, 2214, 2215, Douglas; Nat. 1040, 1041, 1042, Douglas.] *Gen. Manager*, J. Dalrymple; *Traffic Supt.*, L. Mackinnon; *Chief Eng.*, J. Ferguson; *Elec. Eng.*, E. T. Goslin; *Sec.*, J. N. Wilson; *Chairman Try. Com.*, Coun. R. Kirkland; *Vice-Chairman*, Coun. J. Alston.

Gloucester Corporation Light Railway, Bristol Road Depôt, Gloucester. [T.A., Tramways, Gloucester; T.N. 155.] *Gen. Manager and Elec. Eng.*, F. H. Corson; *Chairman Try. Com.*, Coun. J. O. Roberts; *Vice-Chairman*, Coun. C. J. Ramstedt.

Great Yarmouth Corporation Tramways, Caister Road, Great Yarmouth. [T.N. 265.] *Gen. Manager*, F. L. Turner; *Elec. Eng.*, Gordon Bryant *Per. Way Eng.*, J. W. Cockrill (Borough Surveyor); *Chairman Try. Com.*, Ald. C. A. Campling; *Vice-Chairman*, Coun. J. T. C. Salmon.

Halifax Corporation Tramways, Skircoat Road, Halifax. [T.N., 36.] *Traffic Manager*, Jas. D. Caird; *Try. Eng.*, J. W. Galloway; *Per. Way Eng.*, J. Lord (Boro. Eng.); *Chairman Try. Com.*, Ald. C. F. Spencer; *Vice-Chairman* Coun. A. Fawcett.

Haslingden Corporation Tramways, John Street, Haslingden. *Gen. Manager and Elec. Eng.*, Barnes Kay; *Per. Way Eng.*, J. S. Green (Borough Surveyor); *Chairman Try. Com.*, Coun. Waddington; *Vice-Chairman*, Coun. Haworth.

Herne Bay Pier Tramway (owned and worked by Herne Bay U.D.C.), Herne Bay. [T.N., 22.] *Res. Eng. and Manager*, H. C. Dufton.

Heywood Corporation Tramways, Heywood, Lancs. [T.N., 37.] *Gen. Manager*, J. Stott; *Per. Way Eng.*, J. A. Settle; *Chairman Try. Com.*, Coun. J. Ashworth; *Vice-Chairman*, Ald. T. Popple, J.P.

Huddersfield Corporation Tramways, Northumberland Street, Huddersfield. [T.N., 698 and 398.] *Gen. Manager & Elec. Eng.*, R. H. Wilkinson; *Assist. Engineer*, A. P. Quilliam; *Traffic Supt.*, T. Hartley; *Borough Eng.*, K. F. Campbell; *Chairman Try. Com.*, Ald. J. H. Aston; *Vice-Chairman*, Coun. J. Barlow.

Hull Corporation Tramways, Alfred Gelder St., Hull. [T.N., 443 & 444, Corporation.] *Manager*, Wm. J. McCombe; *Elec. Eng.*, J. Wilkinson; *Per. Way Eng.*, A. E. White; *Rolling Stock Supt.*, ; *Chairman Try. Com.*, Coun. J. H. Hargreaves (Mayor); *Vice-Chairman*, Coun. W. Wheatley.

Ilford Urban District Council Tramways, Ley Street, Ilford. [T.N., 684.] *Manager*, L. E. Harvey; *Traffic Manager*, A. Woolstencroft; *Works Supt.*, H. H. Simpson; *Chairman Try. Com.*, Coun. R. Stroud; *Vice-Chairman*, Coun. J. Deveson.

Ilkeston Corporation Tramways, Park Road, Ilkeston. [T.A., Bellamy, Ilkeston; T.N., 26.] *Manager and Elec. Eng.*, L. C. F. Bellamy; *Chairman Try. Com.*, Ald. S. Shaw; *Vice-Chairman*, Ald. W. Tatham.

Ipswich Corporation Tramways, Constantine Road, Ipswich. [T.A., Ayton, Tramways, Ipswich; T.N., 354.] *Gen. Manager and Elec. Eng.*, Frank Ayton; *Traffic Supt.*, A. Butler; *Rolling Stock Supt.*, W. A. Fairhead; *Chairman Try. Com.*, Coun. E. C. Ransome; *Vice-Chairman*, W. P. Burton.

Kearsley Urban District Council Tramways, Council Office, Kearsley, Farnworth, S.O. *Clerk U. D. C.*, H. Martin.

[Lines leased to and worked by the South Lancashire Tramways Co.]

Keighley Corporation Tramways, South Street, Keighley. [T.A., Tramways, Keighley; T.N., 17.] *Gen. Manager and Elec. Eng.*, H. Webber; *Chairman Try. Com.*, Coun. A. Smith.

Kilmarnock Corporation Tramways Electricity Works, Kilmarnock. [T.N., 95.] *Elec. Eng. and Manager*, W. C. Bexon; *Consulting Engineers*, Kennedy and Jenkin; *Convener Try. Com.*, Coun. Finlay.

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ELECTRIC TRAMWAYS IN THE UNITED KINGDOM.

Kirkcaldy Corporation Tramways, Electricity Works, Victoria Road, Kirkcaldy. [T.A., Tramways, Kirkcaldy. T.N., 124, 174, and 175.] *Manager & Elec. Eng.*, O. F. Francis; *Traffic Manager*, Jas. Fisher; *Chairman Try. Com.*, Coun. G. Fergusson.

Lancaster Corporation Tramways, Electricity Works, Lancaster. [T.A., Milnes, Tramways, Lancaster; T.N., 1, L.] *Gen. Manager & Elec. Eng.*, G. C. Milnes; *Traffic Manager*, W. T. Charlton; *Chairman Try. Com.*, Coun. T. Wilkinson.

Leeds City Tramways, Standard Buildings, City Square, Leeds. *General Manager*, J. B. Hamilton; *Traffic Supt.*, A. Daggett; *Elec. Eng.*, John Burbridge; *Per. Way Eng.*, R. B. Holt; *Car Works Supt.*, G. E. Watmough; *Chairman Try. Com.*, Ald. R. A. Smithson; *Vice-Chairman*, Ald. H. Brown.

Leicester Corporation Tramways, 20 and 22, Humberstone Gate, Leicester. [T.N., 409.] *Manager & Sec.*, A. F. Lucas; *Boro. & Try. Eng.*, E. G. Mawbey; *Elec. Eng.*, T. R. Smith; *Cons. Engs.*, Kincaid, Waller, & Manville; *Chairman Try. Com.*, Ald. S. Flint, J.P.; *Vice-Chairman*, Ald. G. Banton, J.P.

Leith Corporation Tramways, 165, Leith Walk, Leith. [T.N., 415.] *Gen. Manager*, F. A. Fitzpayne; *Per. Way Eng.*, J. R. Findlay (*Burgh Eng.*); *Chairman Try. Com.*, Judge Hall.

Leyton District Council Tramways, Car Depot, Lea Bridge Road, Leyton, E. [T.A., Tramways, Leyton; T.N., 17 Walthamstow.] *Manager*, F. Schofield; *Elec. Eng.*, F. Harman Lewis; *Per. Way Eng.*, E. H. Essex; *Chairman Try. Com.*, Coun. H. Heather.

Lincoln Corporation Tramways, Brayford Side North, Lincoln. [T.A., Stanley Clegg, Lincoln; T.N., 109]. *General Manager and Elec. Eng.*, Stanley Clegg; *Chairman Try. Com.*, Ald. W. S. White; *Vice-Chairman*, Coun. M. A. Ashley.

Liverpool Corporation Tramways, 24, Hatton Garden, Liverpool. [T.A., Tramways, Liverpool; T.N., 6054 and 7701, Central.] *General Manager*, C. W. Mallins; *Per. Way Eng.*, J. A. Brodie; *Rolling Stock Supt.*, T. Ridyard; *Chairman Try. Com.*, Ald. F. Smith, J.P.; *Vice-Chairman*, Major R. J. Clarke.

London County Council Tramways, 62, Finsbury Pavement, London, E.C. [T.A., Lotram, London; T.N., 3321, 3322, and 3323 London Wall.] *Chief Officer*, A. L. C. Fell; *Deputy Chief Officer*, J. K. Bruce; *Elec. Assist.*, J. Shepherd; *Traffic Assist.*, L. Slattery; *Rolling Stock Supt.*, W. E. Ireland; *Per. Way Eng.*, J. Welling; *Chairman Highways Com.*, G. H. Hume; *Vice-Chairman*, Lord Monk Bretton.

Lowestoft Corporation Tramways, Norwich Road, Lowestoft. [T.N., 87.] *Gen. Manager*, H. H. Saunders; *Elec. Eng.*, W. R. May; *Chairman Try. Com.*, Coun. F. Spashett.

Maidstone Corporation Tramways, Tramway Offices, Tonbridge Road, Maidstone. [T.A., Lambert, Tramways, Maidstone; T.N., 72 B.] *Gen. Manager and Elec. Eng.*, A. T. Lambert; *Cons. Eng.*, S. Sellon; *Chairman Try. Com.*, Coun. Lyle; *Vice-Chairman*, Coun. Green.

Manchester Corporation Tramways, 55, Piccadilly, Manchester. [T.A., Tramways, Manchester; T.N., 6010 Central.] *Gen. Manager*, J. M. McElroy; *Traffic Sup.*, J. T. Oakes; *Elec. Eng.*, J. J. McMahon; *Chief Civil Eng.*, H. Mattinson; *Rolling Stock Supt.*, G. R. Blackburn; *Chairman Try. Com.*, Ald. J. Bowes; *Vice-Chairman*, Coun. A. W. Chapman.

Middlesex County Council Light Railways, Middlesex Guildhall, Westminster, London, S.W. *County Eng.*, H. T. Wakelam, M.I.C.E.; *Chairman of Light Railways Com.*, County Ald. H. Burt; *Vice-Chairman*, County Coun. F. Goodyear.

Middleton Corporation Tramways. *Consulting Engs.*, Lacey, Sillar, and Leigh; *Chairman Try. Com.*, Coun. W. Wood, J.P.; *Vice-Chairman*, Ald. Bentley, J.P. [Worked by Manchester Corporation Tramways.]

Nelson Corporation Light Railways, Charles Street, Nelson. [T.N., 115.] *Manager and Elec. Eng.*, G. F. Nayler; *Per. Way Eng.*, W. Shackleton; *Chairman Try. Com.*, Coun. W. F. Cooke.

Newcastle-upon-Tyne Corporation Tramways, Manors, Newcastle. [T.A., Traction, Newcastle; T.N., 913 & 914 Nat., 241 P.O.] *Gen. Manager & Engineer*, Ernest Hatton; *Traffic Supt.*, T. Chalder; *Per. Way Eng.*, W. J. Steele; *Chairman Try. Com.*, Ald. J. H. Rodgers; *Vice-Chairman*, Coun. R. Mayne.

Newport (Mon.) Corporation Tramways, Town Hall, Newport, Mon. [T.A., Dynamo, Newport, Mon.; T.N., 990 L., Nat.] *Gen. Manager*, N. J. Young; *Boro. Elec. and Per. Way Eng.*, A. Nichols Moore; *Chairman Try. Com.*, Coun. J. Moxon; *Vice-Chairman*, Ald. F. Phillips.

Northampton Corporation Tramways. St. James', Northampton. [T.N., 248.] *Gen. Manager*, J. Gottschalk; *Elec. Eng.*, J. F. Cameron; *Chairman Try. Com.*, Coun. T. D. Lewis; *Vice-Chairman*, Coun. W. Beale.

Nottingham Corporation Tramways, Beastmarket Hill, Nottingham. [Tramways, Nottingham; T.N., 225.] *General Manager & Elec. Eng.*, John Aldworth; *Traffic Supt.*, H. Morley; *Per. Way Eng.*, Arthur Brown (*City Eng.*); *Rolling Stock Supt.*, W. Boot; *Chairman Try. Com.*, Coun. R. H. Swain; *Vice-Chairman*, Ald. F. R. Radford.

Oldham Corporation Tramways, Wallshaw Depot, Oldham. [T.A., Tramways, Oldham; T.N., 1495.] *Gen. Manager & Eng.*, J. W. Dugdale; *Traffic Supt.*, J. Brierley; *Chairman Try. Com.*, Ald. F. G. Isherwood; *Vice-Chairman*, Coun. F. Elliot.

Perth Corporation Tramways, Electricity Works, Perth. [T.N., 226 & 101.] *Tramways Manager*, W. G. Snell; *Elec. & Tramways Eng.*, John Lambert; *Per. Way Eng.*, R. McKillop (*Burgh Surv.*); *Chairman Try. Com.*, Coun. Calderwood.

Plymouth Corporation Tramways, 15, Ebrington Street, Plymouth. [T.N. 518, Plymouth.] *General Manager*, C. B. Everson; *Elec. Eng.*, E. J. Okell; *Chairman Try. Com.*, Ald. S. H. Phillips, J.P.

Pontypridd Urban District Tramways, Generating Station, Treforest, Pontypridd. [T.N. 33.] *Gen. Manager and Elec. Eng.*, J. E. Teasdel; *Traffic Inspector*, W. May; *Per. Way Eng.*, W. E. Lowe (*Surveyor*); *Chairman Try. Com.*, Coun. Wm. Phillips.

Portsmouth Corporation Tramways, Town Hall, Portsmouth. [T.N., 110 Corporation.] *Gen. Manager*, W. R. Spaven; *Elec. and Per. Way Eng., and Rolling Stock Supt.*, V. G. Lironi; *Traffic Supt.*, W. Munford; *Chairman Try. Com.*, Ald. J. H. Corke, J.P. (Mayor); *Vice-Chairman*, Coun. J. Timpson.

Preston Corporation Tramways, Holmrook Road, Preston. [T.A., Corporation Tramways, Preston; T.N., 273.] *Gen. Manager and Elec. Eng.*, J. F. Simpson; *Traffic Supt.*, E. Lafferty; *Chairman, Try. Com.*, Ald. J. Ormrod; *Vice-Chairman*, Coun. T. Parkinson.

Radcliffe Urban District Council Tramways, Council Offices, Radcliffe, Lancs. *Res. Eng.*, H. Wilkinson; *Per. Way Eng.*, W. L. Rothwell; *Clerk*, S. Mills; *Chairman Try. Com.*, Coun. Walker Allen, J.P. [These tramways are worked as part of the Bury system.]

Rawtenstall Corporation Tramways, Bacup Road, Rawtenstall. [T.N., 81 and 85.] *Gen. Manager and Elec. Eng.*, C. L. E. Stewart; *Chairman Try. Com.*, Ald. H. Coupe, J.P.; *Vice-Chairman*, Coun. J. W. Stansfield.

Reading Corporation Tramways, Mill Lane, Reading. [T.A., Tramways Manager, Reading; T.N., 330.] *Gen. Manager & Elec. Eng.*, G. F. Craven; *Chairman Try. Com.*, Ald. C. G. Field, J.P. (Mayor).

Rochdale Corporation Tramways, Mellor Street, Rochdale. [T.A., Tramways, Rochdale; T.N., 48.] *Gen. Manager & Eng.*, G. Webster; *Traffic Manager*, R. Bentley; *Rolling Stock Supt.*, E. Sidgwick; *Chairman Try. Com.*, Ald. Taylor.

Rotherham Corporation Tramways, Rawmarsh Road, Rotherham. [T.A., Cross, Rotherham; T.N., 138, 152, and 241.] *General Manager & Elec. Eng.*, E. Cross; *Deputy Elec. Eng.*, J. Williams; *Traffic Manager*, H. Jagger; *Per. Way Eng.*, E. B. Martin; *Rolling Stock Supt.*, C. A. Walker; *Chairman Try. Com.*, Ald. D. L. Winter; *Vice-Chairman*, Coun. T. Reeves.

St. Helens Corporation Tramways, Town Hall, St. Helens, Lancs. *Chairman Try. Com.*, Ald. Sir J. Beecham; *Vice-Chairman*, Coun. W. N. Pilkington. [Lines worked by the New St. Helens and District Tramways Co.]

Salford Corporation Tramways, 32, Blackfriars Street, Salford. [T.A., Tramways, Salford; T.N., 5367 and 5368 Central.] *Gen. Manager*, Geo. W. Holford; *Elec. Eng.*, H. J. Hawkins; *Traffic Supt.*, W. Blakemore; *Per. Way Supt.*, H. Richardson; *Rolling Stock Supt.*, R. Chadwick; *Chairman Try. Com.*, Ald. H. Linsley, J.P.; *Vice-Chairman*, Coun. W. H. Barrett.

Sheffield Corporation Tramways, 8, Division Street, Sheffield. [T.A., Tramways, Sheffield; T.N., 4600.] *General Manager*, A. R. Fearnley; *Elec. Eng.*, H. E. Yerbury; *Traffic Supt.*, A. Handford; *Per. Way Eng.*, W. J. Hadfield; *Rolling Stock Supt.*, J. Smith; *Chairman Try. Com.*, Ald. Sir W. Clegg, J.P.; *Vice-Chairman*, Coun. A. T. Bescoby, J.P.

Shipley Urban District Tramway, Dockfield, Shipley. [T.A., Electricity Works, Shipley; T.N., 190.] *Elec. Eng.*, ; *Chairman Try. Com.*, H. Pitts. [Lines leased to Bradford Corporation.]

Southampton Corporation Tramways, 161, Above Bar, Southampton. [T.A., Tramways, Southampton; T.N., 301.] *Gen. Manager*, Leonard Johnston; *Boro. Elec. Engineer*, H. F. Street; *Traffic Manager*, C. G. Simpson; *Chairman Try. Com.*, Ald. F. A. Dunsford, J.P.

Southend-on-Sea Corporation Tramways, London Road, Southend-on-Sea. [T.N., 96.] *Gen. Manager and Elec. Eng.*, R. Birkett; *Traffic Manager*, J. Daniells,; *Per. Way Eng.*, E. J. Elford (*Boro. Surveyor*); *Rolling Stock Supt.*, J. Dobson; *Chairman Try. Com.*, Ald. A. Martin.

Southend Pier Electric Railway, (owned and worked by Southend-on-Sea Corporation), [T.A., Piermaster, Southend; T.N., 91.] Southend-on-Sea. *Elec. Eng.*, C. R. Norton; *Piermaster*, Capt. N. E. Hucker; *Chairman*, Coun. H. Dowsett.

Southport Corporation Tramway, 44, Chapel Street, Southport. [T.N., 116.] *Gen. Manager*, T. J. Kendrew; *Boro' Elec. Eng.*, A. S. Black; *Chairman Try. Com.*, Coun. T. S. Richardson; *Vice-Chairman*,

South Shields Corporation Tramways, Dean Road, South Shields. [T.A., Tramways, South Shields; T.N., 157.] *Gen. Manager & Elec. Eng.*, W. T. Robson; *Boro. Elec. Eng.*, H. S. Ellis; *Chairman Try. Com.*, Ald. W. G. Wylie; *Vice-Chairman*, Ald. J. W. Henderson.

Stalybridge Hyde, Mossley, and Dukinfield Tramways and Electricity Board, Waterloo Road, Stalybridge. [T.N., 311.] *Commercial Manager*, F. Schofield; *Chief Eng.*, R. Blackmore; *Chairman Try. Com*, Ald. T. Perrin, J.P.; *Vice-Chairman*, Ald. H. Sykes.

Stockport Corporation Tramways, Mersey Square, Stockport. [T.N., 232 and 237.] *Manager*, A. T. Eardley; *Elec. Eng.*, R. Lomax; *Chairman Try. Com.*, Ald. Chas. Sharples; *Vice-Chairman*, Ald. W. E. Hamnett.

Sunderland Corporation Tramways, Tramway Offices, Monkwearmouth, Sunderland. [T.A., Trys. Manager, Sunderland; T.N., 948.] *Gen. Manager and Elec. Eng.*, A. R. Dayson; *Chairman Try. Com.*, Coun. G. New, J.P.; *Vice-Chairman*, Coun. W. Walker.

Swindon Corporation Tramways, Electricity Works, Swindon. [T.A., Tramways, Swindon; T.N., 28 and 4.] *Manager*, T. Medcalf; *Elec. Eng.*, A. Dimmack; *Consulting Engs.*, Lacey, Sillar, & Leigh; *Chairman Try. Com.*, Coun. J. J. Shawyer; *Vice-Chairman*, Coun. T. C. Newman.

Wallasey Corporation Tramways, Seaview Road, Wallasey. [T.A., Tramways, Liscard T.N., 439, Liscard.] *General Manager*, R. R. Greene; *Elec. Eng.*, J. H Crowther; *Per. Way Eng.*, W. H. Travers; *Chairman Try. Com.*, Ald. J. Farley; *Vice-Chairman*, Coun. W. Eastwood.

Walsall Corporation Tramway, Birchills Depot, Bloxwich Road, Walsall. [T.A., Tramways, Walsall; T.N., 264.] *Gen. Manager*, R. L. Horsfield; *Elec. Eng.*, H. A. Howie; *Per. Way Eng.*, J. Taylor (*Boro. Surveyor*); *Chairman, Try. Com.*, Ald. J. Cope; *Vice-Chairman*, Ald. J. Williams.

Walthamstow Urban District Council Tramways, Chingford Road, Walthamstow, [T.A., Tramways, Walthamstow; T.N., 20.] *Tramways Manager*, W. Murray; *Elec. Eng.*, G. R. Spurr (Priory Avenue, Walthamstow); *Per. Way Eng.*, G. W. Holmes; *Chairman Trys. Com.*, Coun. E. Samuels.

Warrington Corporation Tramways, Mersey Street, Warrington. [T.N., 196] *Gen. Manager*, J. Telfer; *Elec. Eng.*, F. V. L. Mathias; *Chairman Try. Com.*, Coun. Dr. G. W. Joseph; *Vice-Chairman*, Coun. J. Wilkinson.

West Bromwich Corporation Tramway, Electricity Works, West Bromwich. [T.N., 100.] *Boro. Eng.*, A. D. Greatorex; *Boro. Elec. Eng.*, W. A. Jackson; *Chairman Try. Com.*, Ald. A. G. Turley, J.P. [These tramways are leased to the South Staffs. (Lessee) Co., Ltd.]

West Ham Corporation Tramways, Greengate Street, Plaistow, London, E. [T.A., Trameurs, London; T.N., 868 East.] *General Manager*, J. S. D. Moffet; *Boro' Elec. Eng.*, J. W. Beauchamp; *Per. Way Eng.*, J. G. Morley (*Boro. Eng.*); *Chairman Try. Com.*, Ald. H. W. Littler.

West Hartlepool Corporation Tramways, Cleveland Road, West Hartlepool. [T.N., 6073.] *Gen. Manager & Eng.*, Chas. Burgess; *Chairman Try. Com.*, Coun. Martin; *Vice-Chairman*, Coun. Charlton.

Wigan Corporation Tramways, Bradford Place, Wigan. [T.A., Trolley, Wigan; T.N., 162.] *Gen. Manager and Elec. Eng.*, James Slevin; *Traffic Manager*, F. Buckley; *Per. Way Eng.*, W. Bolton; *Chairman Try. Com.*, Coun. R. Fletcher; *Vice-Chairman*, Coun. J. Walkden.

Wolverhampton Corporation Tramways, Municipal Tramway Offices, Cleveland Road, Wolverhampton. [T.N., 324.] *Gen. Manager*, W. A. Luntley; *Tramways Eng. and Deputy Gen. Manager*, C. O. Silvers; *Boro. Elec. Eng.*, S. T. Allen; *Per. Way Eng.*, George Green; *Chairman Try. Com.*, Ald. Sir C. T. Mander, Bart., J.P.; *Vice-Chairman*, Ald. S. Craddock, J.P.

York Corporation Tramways, 8, Clifford Street, York. [T N., 302]. *Gen. Manager and Elec. Eng.*, J. W. Hame; *Traffic Supt.*, J. W. Horton; *Per. Way Eng.*, F. W. Spurr (City Surveyor); *Chairman Try. Com.*, Ald. S. W. Meyer; *Vice-Chairman*, Coun. S. H. Davies.

COMPANY TRAMWAYS.

Aberdeen Suburban Tramways Company, 15, Golden Square, Aberdeen. [T.A., Judicial, Aberdeen; T.N., 447.] *Manager*, A. Wilkie; *Sec.*, G. Duncan; *Chairman*, James Mearns; *Directors*, W. Jackson, Dr. Christie.

Airdrie and Coatbridge Tramways Company, Tramway Depôt, Main Street, Coatbridge [T.N., 105], and Electrical Federation Offices, Kingsway, London, W.C. *Gen. Manager*, A. Robertson; *Sec.*, P. N. Gray; *Chairman*, W. L. Madgen; *Directors*, H. S. Day, A. C. Miles.

Barnsley and District Electric Traction Company, Ltd., Car Depot, Sheffield Road, Barnsley. [T.A., Tramways, Barnsley; T.N., 159.] *Manager and Eng.*, P. H. Marco, A.I.E.E.; *Sec.*, S. M. Wright; *Chairman*, E. Garcke; *Directors*, Col. Sir Thomas Pilkington, Bart., E. A. Paris.

Barrow-in-Furness Tramways, Salthouse Road Depot, Barrow, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tramways, Barrow; T.N., 125.] *Manager*, W. F. Bladon; *Sec.*, T. Phillips-Conn; *Chairman*, H. S. Day; *Directors*, J. V. Kitchener, E. R. Soames.

Bath Electric Tramways Company, Ltd., Walcot Street, Bath, and 119-125, Finsbury Pavement, London, E.C. [T.A., Trams, Bath; T.N., 214.] *Gen. Manager and Eng.*, W. E. Hardy; *Traffic Supt.*, E. Seckington; *Sec.*, H. J. Almond; *Chairman*, Hon. Sir J. Sivewright, K.C.M.G.; *Directors*, H. F. Clutterbuck, E. H. R. Trenow, A. A. C. Swinton, E. Callaird.

Bessbrook and Newry Tramway Company, Bessbrook, Co. Armagh. [T.A., Tramways, Bessbrook.] *Manager*, Robert Caven; *Elec. Eng.*, J. L. D. Meares; *Chairman*, J. N. Richardson; *Directors*, C. H. Richardson, R. T. Scott, T. W. Richardson, T. McGreggor Greer.

Birmingham District Power and Traction Company (section of the Birmingham and Midland Tramways Joint Committee), Power Station, Downing Street, Smethwick, and Electrical Federation Offices, Kingsway, London, W.C. [T.N., 65 Smethwick.] *Electrical Eng.*, S. A. Mahood; *Gen. Manager*, W. G. Bond; *Secretary*, B. Kingsford; *Chairman*, C. Shirreff Hilton; *Directors*, J. A. Lycett, W. L. Madgen, S. R. Blundstone.

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ELECTRIC TRAMWAYS IN THE UNITED KINGDOM.

Blackpool and Fleetwood Tramroad Company, Ltd., Bispham, near Blackpool. [T.A., Cameron, Blackpool; T.N., 121.] *General Manager and Secretary*, J. Cameron; *Elec. Eng.*, A. Cameron; *Chairman*, John Greenwood; *Directors*, R. H. Prestwich, R. B. Barningham, R. S. Boddington, G. Richardson, G. Readman.

Blackpool and Fylde Light Railway Company, 5, Clifton Street, Blackpool. (No appointment of engineer or officials yet made.) *Secretary*, R. Bibby; *Chairman*, John Greenwood; *Directors*, T. Fisher, J.P., John Platt, J.P., W. Hardman, J.P., R. H. Mabbott.

Blackpool, St. Anne's, and Lytham Tramways Company, Ltd., Squires Gate, and 30, Birley Street, Blackpool. [T.N., 327 and 22]. *Gen. Manager and Elec. Eng.*, H. W. Laing; *Traffic Manager*, G. W. Wood; *Rolling Stock Supt.*, J. Partington; *Secretary*, Chas. E. Riding; *Chairman*, G. Nicholson; *Directors*, T. M. Smith, T. Preston.

Bray and Enniskerry Railway Company, 52, Westland Row, Dublin. *Sec.*, M. F. Keogh; *Chairman*, A. Killingley; *Director*, F. M'Crea.

Brighton Beach Electric Railway, Madeira Road, Brighton. [T.A., Volk, Brighton; T.N., 14 P.O.] *Manager and Eng.*, M. H. Volk; *Traffic Superintendent*, H. Sheppard; *Per. Way Eng.*, J. Barker; *Secretary*, A. Volk; *Chairman*, M. Volk; *Directors*, M. H. Volk, B. W. Symonds.

Bristol Tramways and Carriage Company, Ltd., Clare Street House, Bristol. [T.A., Cab, Bristol; T.N., 74 & 3074 Nat.] *Manager*, Chas. Challenger; *Assist. Manager*, S. E. Smith; *Electrical Engineer*, W. H. Munton; *Permanent Way Engineer*, G. T. C. Edwards; *Secretary*, H. F. Cooper; *Chairman*, Sir G. White, Bart.; *Directors*, S. White, J.P. (*Managing*), J. H. Howell, J.P., Hugh G. Doggett.

British Electric Traction Company, Ltd., Electrical Federation Offices, Kingsway, London, W.C. E. Garcke (*chairman and managing director*); *Directors*, P. D. Tuckett, C. Shirreff B. Hilton, J. S. Raworth, W. L. Madgen, G. Cornwallis West; *Secretary*, C. H. Dade; *Accountant*, C. Walmsley.

This company controls the following tramways, particulars of which are given under their respective names:

Airdrie & Coatbridge.	Metropolitan.
Barnsley & District.	Middleton.
Barrow-in-Furness.	North Staffordshire.
Birmingham & Midland Trys. Joint Com.:	Oldham, Ashton, & Hyde.
Birmingham & Midland	Peterborough.
Dudley, Stourbridge, & District.	Potteries.
South Staffordshire.	Rotherham.
Wolverhampton Dist.	Sheerness & District.
Devonport & District.	South Metropolitan.
Gateshead & District.	Southport.
Gravesend & Northfleet.	Swansea.
Greenock & Port Glasgow.	Taunton.
Hartlepool.	Tynemouth & District.
Jarrow & District.	Weston-super-Mare & District.
Kidderm'ster & Stourport.	Worcester.
Merthyr.	Wrexham & District.
	Yorkshire (Woollen Dist.)

Burton and Ashby Light Railways, Power Station, Swadlincote, nr. Burton-on-Trent. [T.A., Toulmin, Swadlincote; T.N., 1.] *Manager and Eng.*, Jas. Toulmin; *Secretary*, A. L. Charles; *Chairman*, G. Murray Smith.

[The line is owned and worked by the Midland Railway Company.]

Camborne and Redruth Tramways, Elec. Works, Carn Brea, R.S.O., Cornwall. [T.N., 3, Camborne.] (Owned by Urban Elec. Supply Co.) *Manager and Eng.*, L. A. Hards; *Sec.*, C. H. Jones; *Chairman*, P. D. Tuckett; *Directors*, E. Charrington, H. B. Grotian, Douglas Owen.

Carlisle Tramways Company, Ltd., City of, Depot and Offices, London Road, Carlisle. [T.A., Tramways, Carlisle; T.N., 0180.] *Engineer and Manager*, E. W. Sleight.

Chatham and District Light Railways Company, Luton Road, Chatham, and 83, Cannon Street London, E.C. [T.A., Tramways, Chatham; T.N., 51.] *General Manager*, W. Jensen; *Assist. Manager*, J. C. Whiteley; *Traffic Manager*, W. G. Davis; *Secretary*, A. Clements; *Chairman*, A. R. Monks; *Directors*, H. C. Levis, J. F. Nauheim, W. B. H. Martindale.

Cheltenham and District Light Railway Company, Cheltenham. [T.N., 341.] *Directors*, A. H. Beatty (*Chairman*), W. Shearer, H. L. Williams, A. S. Guinness, H. J. McCormick; *Sec.*, Wm. C. Bryden, C. A., 66, Queen Street, London, E.C.; *Local Eng. and Manager*, Henry J. McCormick, St. George's Road, Cheltenham.

Clontarf and Hill of Howth Tramroad Company, 39, Dame Street, Dublin. [T.A., c/o Railways, Dublin; T.N., 917.] *Secretary*, J. P. Chapman; *Chairman*, W. L. Murphy; *Directors*, E. Anderson, J. J. Dudley.

Cork Electric Tramways and Lighting Company, Ltd., Albert Street, Cork. [T.A., Tramways, Cork; T.N., 78 and 536.] *Manager and Engineer*, H. H. Nalder; *Traffic Manager*, H. G. Whiting; *Per. Way Engineer*, H. Mack; *Secretary*, A. Clements; *Chairman*, A. R. Monks; *Directors*, E. Anderson, W. M. Murphy, W. B. H. Martindale, H. C. Levis.

Dartford Urban District Council Tramways, Car Depot, Priory Road, Dartford. [T.N., 31 Dartford.] (Leased to and worked by Balfour, Beatty, & Co., Ltd., 22a, College Hill, London, E.C.) *Gen. Manager and Engineer*, D. N. R. Bruce.

Devonport and District Tramways Company, Tramway Depot., Milehouse, Devonport, and Electrical Federation Offices, London, W.C. [T.A., Head Office, Devonport c/o Tramway. London; T.N., Head Office, Holborn 2686. T.A., Tramways, Milehouse, Devonport; T.N., 62.] *Manager and Eng.*, George Cardwell; *Secretary*, S. M. Wright; *Chairman*, C. S. B. Hilton; *Directors*, J. S. Raworth, E. R. Soames, C. G. Tegetmeier.

Dewsbury, Batley, and Birstall Tramways Company, Ltd., Electrical Federation Offices, Kingsway, London, W.C.

[Lines worked by Yorkshire (Woollen District) Electric Tramways, Ltd., *q.v.*]

Dewsbury and Ossett Corporation and Soothill Nether Urban District Council Tramways, (Lessees: The National Elec. Construction Co., Ltd., 3, Laurence Pountney Hill, London, E.C.) [T.A., Overhauled, London; T.N., 5329 and 5330 Bank.] *Manager*, W. MacGibbon.

Douglas—Ramsey. (The Manx Elec. Rly. Company), 1, Strathallan Crescent, Douglas. (See Manx Electric Railway Company).

Douglas Southern Electric Tramways, Ltd., Marine Drive, Douglas, Isle of Man, and 24, Brazennose Street, Manchester. [T.A., Traffic, Douglas.] *Manager and Eng.*, R. Orton; *Sec.*, J. E. Sharples; *Chairman*, T. J. Hutchinson; *Directors*, I. E. Winslow, E. A. Hopkins.

Dublin and Lucan Electric Railway Company, 15, Conyngham Road, Dublin. [T.A., Lucan Tramway, Dublin; T.N. 2282 and 4006 Dublin, and 5 Lucan.] *Manager, Elec. Eng., and Sec.*, D. McDowall Grosart; *Chairman*, J. W. Hill; *Vice-Chairman*, Capt. C. C. Vesey; *Directors*, E. Anderson, H. B. Coyle.

Dublin United Tramways Company (1896), Ltd., 9, Upper Sackville Street, Dublin. [T.A., Tramways, Dublin; T.N., 58 and 59.] *Manager*, C. W. Gordon; *Elec. Eng.*, G. M. Harriss; *Con. Eng.*, H. F. Parshall; *Per. Way Eng.*, P. F. O'Sullivan; *Secretary*, R. S. Tresilian; *Chairman*, W. M. Murphy; *Directors*, W. F. Cotton, Capt. C. N. Colthurst Vesey, J. Mooney.

Dudley, Stourbridge and District Electric Traction Company, Ltd. (Section of The Birmingham and Midland Tramways Joint Committee), Power Station, Downing Street, Smethwick, Brierley Hill, Staffs., and Electrical Federation Offices, Kingsway, London, W.C. [T.N., 65, Smethwick.] *General Manager*, W. G. Bond; *Secretary*, E. H. Woodhall; *Chairman*, S. R. Blundstone; *Directors*, J. A. Lycett, W. G. Bond.

Dumbarton Burgh and County Tramways Company, Tramway Depot, Dumbarton, and 23, Rutland Street, Edinburgh. [T.A., Tramways, Dumbarton; T.N., 119.] *Gen. Manager and Elec. Eng.*, J. P. McMahon; *Secretary*, J. Dishart; *Chairman*, G. Balfour; *Directors*, K. Sanderson, K. A. Scott Moncrieff.

Dundee, Broughty Ferry & District Tramways Company, Milton, Monifieth, N.B. [T.N., 24 Monifieth.] *Gen. Manager & Engineer*, Daniel Fisher; *Secretary*, E. Cowan; *Chairman*, W. Brownlee; *Directors*, Geo. Balfour, D. W. Wybrants, David Hynds.

Dunfermline and District Tramways Company, Tramway Depot, Cowdenbeath, Fife, and 8, New Row, Dunfermline. *Manager and Engineer*, J. H. Shepherd; *Secretary*, G. A. Nicolson; *Cons. Engs.*, Hawtayne & Zeden; *Directors*, Wm. Low, G. Balfour (*managing*), K. Sanderson, D. Hynd.

Falkirk & District Tramways Company, Larbert Road, Larbert, Stirlingshire. [T.A., Tramway Co., Falkirk; T.N., 154 Falkirk.] *Gen. Manager and Secretary*, D. Hays; *Chairman*, G. M. Brown; *Directors*, A. W. Tait, R. Hunter, G. Balfour, C. D. Geddes.

Felixstowe Pier Railway, Felixstowe. (The Coast Development Corporation, Ltd.) *Elec. Eng.*, E. A. Lambert.

Gateshead and District Tramways Company, Tramway Depôt, Sunderland Road, Gateshead, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tramway Depôt, Gateshead; T.N., 125 & 408 Gateshead.] *General Manager*, William Morrison; *Directors*, H. A. Stagg, C. S. B. Hilton (*deputy chairman*), L. A. Atherley-Jones, K.C., H. S. Day.

Giant's Causeway and Portrush Electric Tramway Company, Portrush. *Manager & Sec.*, D. Fall; *Elec. Eng.*, W. A. Traill; *Chairman*, A. Traill; *Directors*, C. M'D. Stuart, J. S. Moore, W. A. Traill.

Glossop Tramways, Electricity Works, Glossop (owned by the Urban Electric Supply Co.) [T.N., 31, Glossop.] *Manager and Res. Eng.*, C. E. Knowles; *Rolling Stock Supt.*, A. W. Bullough; *Secretary*, C. H. Jones; *Chairman*, P. D. Tuckett; *Directors*, E. Charrington, F. E. Gripper, H. B. Grotrian, D. Owen.

Gosport and Fareham Tramways, Tramways and Lighting Office, Gosport, Hants., and Moorgate Station Chambers, London, E.C. [T.A., Tramways, Gosport; T.N., 3, National, Gosport, and 16, Municipal, Gosport.] *Eng. and Manager*, J. Fereday Glenn; *Sec.*, J. Barber Glenn; *Chairman*, A. Beattie, J.P., D.L.; *Directors*, J. Barber Glenn (*managing*), S. Hern.

Gravesend & Northfleet Electric Tramways, Ltd., Tramway Depot, Northfleet, Kent, and Electrical Federation Offices, Kingsway, London, W.C. [T.N., 958, Gravesend.] *Manager & Sec.*, P. N. Gray; *Chairman*, W. L. Madgen; *Directors*, J. F. Albright, W. S. Wreathall.

Great Crosby Tramways, 31, James Street, Liverpool.

[This tramway is worked by the Liverpool Overhead Railway Company.]

Great Grimsby Street Tramway Co., Southampton House, Cleethorpes, and Moorgate Station Chambers, London, E.C. [T.A., Blanco, Cleethorpes; T.N., 16.] *Manager and Eng.*, H. L. White; *Elec. Eng.*, H. O. White; *Managing Director and Secretary*, J. B. Glenn; *Chairman*, A. Beattie, J.P., D.L.; *Director*, S. Hern.

Greenock and Port Glasgow Tramways Company, Ladyburn, Greenock, and Electrical Federation Offices, Kingsway, London, W.C. [T.A. Tramways, Greenock; T.N., 562]. *Manager*, A. Robertson; *Secretary*, W. F. Herring; *Chairman*, W. L. Madgen; *Directors*, G. J. Somerville, A. C. Miles, H. S. Day.

Guernsey Railway Company, Ltd., Hougue-à-la-Perre, Guernsey. *Manager and Elec. Eng.*, Arthur G. Bird; *Sec.*, J. de Moulpied; *Chairman*, G. F. Peek; *Directors*, W. D. Murdoch, E. Valied, J. B. Collings, Q. Le Pelley.

Hampshire Light Railway (Electric) Company, Ltd., Moorgate Station Chambers, London, E.C. *Secretary*, J. B. Glenn; *Chairman*, A. Beattie, J.P.; *Directors*, J. Barber Glenn (*managing*), S. Hern

[This company works the Portsdown and Horndean Light Railway.]

Hastings Tramways Company, Ltd., Beaufort Road, Silverhill, St. Leonards-on-Sea, and 1, Queen Victoria Street, London, E.C. [T.A., Tramways, Hastings, and Enshrine, London; T.N., 90 Hastings, and 3465, City]. *General Manager and Elec. Eng.*, T. B. Holliday; *Deputy Manager*, W. V. Edwards; *Secretary*, W. R. Elston; *Cons. Engs.*, Kincaid, Waller, Manville, and Dawsen; *Chairman*, G. Kitchen; *Directors*, E. C. Morgan, J. C. Williamson, Dr. Moody.

Imperial Tramways Company, Ltd., Clare Street House, Bristol. *Secretary*, W. G. Verdon Smith; *Manager*, F. Freshwater; *Chairman*, Sir George White, Bart.; *Directors*, H. C. Godfray, Hugh G. Doggett, S. White.

Isle of Thanet Electric Tramways and Lighting Company, Ltd., St. Peter's, Kent, and Moorgate Station Chambers, London, E.C. [T.A., Tramways, St. Peters, Kent; T.N., 29 Broadstairs]. *Gen. Manager and Elec. Eng.*, J. A. Forde; *Traffic Supt.*, A. L. Gardener; *Secretary*, J. Barber Glenn; *Chairman*, A. R. Monks; *Directors*, Lord Arthur Butler, W. M. Murphy, H. Brown.

Jarrow and District Electric Traction Company, Ltd., Electrical Federation Offices, Kingsway, London, W.C. [T.A., Jarrow, c/o Tramway, London; T.N., 2686 Holborn.] *Traffic Manager*, G. McClelland; *Secretary*, C. W. Francis; *Chairman*, G. J. Somerville; *Directors*, W. Morrison (*managing*), H. S. Day.

Kidderminster and Stourport Electric Tramway Company, Kidderminster and Electrical Federation Offices, Kingsway, London, W.C. [T.N., 108]. *Manager and Elec. Eng.*, A. Charlton; *Secretary*, B. Kingsford; *Chairman*, C. S. B. Hilton; *Directors*, J. A. Lycett (*managing*), S. E. Garcke, H. S. Day.

Kinver Tramway, Kinver, and Electrical Federation Offices, Kingsway, London, W.C., *q.v.*, Dudley, Stourbridge, and District Elec. Traction Co., Ltd.

Lanarkshire Tramways Company, Edinburgh Road, Motherwell, N.B., and 83, Cannon Street, London, E.C. [T.A., Tramways, Motherwell; T.N., 64.] *Gen. Manager and Eng.*, G. F. Moller; *Elec. Eng.*, E. H. Glennie; *Per. Way Eng.*, R. Foster; *Traffic Supt.*, J. L. White; *Sec.*, A. Clements; *Chairman*, A. R. Monks; *Directors*, Sir B. Cunard, H. C. Levis, W. H. Whaite, G. Franklin, J. F. Nauheim.

Lancashire United Tramways Limited, Atherton, Lancs. [T.A., Tramways, Atherton; T.N., 36, Atherton.] *Gen. Manager*, E. H. Edwardes; *Secretary*, H. P. Conibear; *Chairman*, Hon. A. Stanley, M.P.; *Directors*, J. M. Henderson, M.P., Sir J. Beecham, J.P., R. Watson, J.P., A. Adam, J. S. Austen.

Liverpool and Prescot Light Railway.—This line, which with the St. Helens Tramways forms the connecting link between the City of Liverpool and South Lancashire Tramways, is owned and worked by the Lancashire United Tramways, Ltd.

Liverpool Overhead Railway Company, 31, James Street, Liverpool. [T.A., Motor, Liverpool; T.N., 5463 Central.] *Gen. Manager and Eng.*, E. J. Neachell; *Secretary*, W. H. Alexander; *Chairman*, H. C. Woodward; *Directors*, J. E. Anderson, G. D. Killey, J. U. Hodgson, M. H. Maxwell.

Llandudno and Colwyn Bay Electric Railway, Limited, Tramway Depôt, Rhôs-on-Sea, Colwyn Bay, and Basildon House, Moorgate Street, London, E.C. *Gen. Manager*, Alex. G. Balfour; *Secretary*, A. W. R. Lovering; *Directors*, G. Balfour, A. W. Tait, T. Stoker.

London United Tramways Ltd., Electrical Federation Offices, Kingsway, London, W.C. *Managing Director*, J. Devonshire; *Secretary*, A. L. Barber; *Gen. Manager and Eng.*, A. H. Pott; *Chairman*, W. M. Acworth; *Directors*, Rt. Hon. Viscount Knutsford, Sir A. H. Stanley, F. V. Schuster.

Luton Corporation Tramways (leased to and worked by Balfour, Beatty & Co., Ltd., 22a, College Hill, London, E.C.), Tramway Offices, Park Street, Luton. [T.N., 230.] *Engineer and Manager*, E. J Vaughan.

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ELECTRIC TRAMWAYS IN THE UNITED KINGDOM.

Mansfield & District Light Railway Co., Sutton Road, Mansfield. [T.A., Cars, Mansfield; T.N., 107.] *Gen. Manager and Sec.*, C. R. Walker; *Chairman*, A. R. Holland; *Directors*, W. I. Chadburn A. H. Beatty, G. Balfour.

Manx Electric Railway Company, Ltd., 1, Strathallan Crescent, Douglas, Isle of Man, and 3, Finch Lane, London, E.C. [T.A., Electric, Douglas, Man.; T.N., 61.] *Gen. Manager & Eng.*, F. Edmondson; *Secretary*, C. A. Huni; *Chairman*, Col. Sir A. Griffith Boscawen; *Directors*, Sir W. H. Vaudrey, B. E. Greenwell, E. Schenk.

Merthyr Electric Traction and Lighting Company, Ltd., 53, Pontmorlais Circus, Merthyr, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tramway Company, Merthyr; T.N., 0180, Merthyr Tydfil.] *Managing Eng.*, L. W. Dixon; *Traffic Supt.*, H. King; *Sec.*, S. J. Clements, *Chairman*, G. J. Somerville; *Directors*, C. G. Tegetmeier, W. L. Madgen, E. R. Soames.

Metropolitan Electric Tramways, Limited, Electrical Federation Offices, Kingsway, London, W.C. [T.A., Metrolito, London; T.N., 2686, Holborn.] Manor House Offices, Seven Sisters Road, N. [T.A., Lentiscus, London; T.N., 77 Tottenham.] *Gen. Manager and Eng.*, A. H. Pott; *Traffic Manager*, W. E. Hammond; *Secretary*, A. L. Barber; *Chairman*, E. Garcke; *Directors*, Sir E. Spencer, W. L. Madgen, G. Richardson, C. G. Tegetmeier, J. Devonshire (*Managing Director*).

Mexborough and Swinton Tramways Company, Electricity Works, Rawmarsh, Yorks. [T.N., 266], and 3, Laurence Pountney Hill, Cannon Street, London, E.C. *Manager and Eng.*, P. Priestly; *Cons. Elec. Eng.*, F. E. Stanley; *Commercial Manager*, Wm. T. Mitchell; *Traffic Supt.*, M. McLeod; *Secretary*, L. D. H. Jacobs; *Chairman*, L. B. Schlesinger; *Director* (*Managing*), W. B. Cownie, C.A.

Middlesbro, Stockton, and Thornaby Electric Tramway, Bridge Road, Stockton-on-Tees, and Clare Street House, Bristol. [T.A., Tramways, Stockton; T.N., 129.] *Manager*, F. Freshwater; *Secretary*, W. G. Verdon Smith; *Chairman*, Sir Geo. White, Bart.; *Directors*, H. C. Godfray, S. White, H. C. Doggett.

Middleton Electric Traction Company, Hiltonfold Lane, Middleton, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tramway Depot, Middleton; T.N., 37 Middleton.] *Gen. Manager*, W. F. Endean; *Secretary*, W. E. Woodroofe; *Chairman*, Lord Vaux of Harrowden; *Directors*, J. V. Kitchener, W. S. Wreathall.

Musselburgh and District Electric Light and Traction Co., Ltd., High Street, Musselburgh, N.B. [T.A., Tramways; T.N., 4.] (Registered Office, 3, Laurence Pountney Hill, London, E.C. [T.N., 5329 and 5330, Bank.]) *Manager*, R. Watson; *Resident Engineer*, J. L. Winter; *Traffic Inspector*, W. Scott; *Secretary*, L. D. H. Jacobs; *Chairman*, L. B. Schlesinger; *Directors*, B. Bernheim, J. Anderson, W. B. Cownie, Dr. K. Lowenfeld.

New General Traction Company, Ltd., 8, Crosby Square, London, E.C. *Managing Director*, E. A. Hopkins; *Secretary*, J. G. Mills; *Chief Engineer*, I. E. Winslow; *Chairman*, Baron E. B. d'Erlanger.

[This company controls the Coventry, the Norwich, and the Douglas Southern Electric Tramways Companies.]

New St. Helens and District Tramways Company, Ltd., Atherton, Lancs. [T.A., Tramways, Atherton; T.N., 36 Atherton.] *Secretary*, H. P. Conibear; *Chairman*, Hon. Arthur Stanley, M.P.; *Directors*, J. Hunter, J.P., H. Martin, J.P., J. M. Henderson, M.P., J. S. Austen, and E. H. Edwardes (*Managing*).

North Shields Tramway Company owned and worked by Tynemouth and District Elec. Trac. Co. *q.v.*

Norwich Electric Tramway Company, 5, Orford Hill, and 8, Crosby Square, London, E.C. [T.A., Tramways, Norwich; T.N., 475.] *Manager and Engineer*, F. W. Ketley; *Consulting Eng.*, I. E. Winslow; *Sec.*, J. G. Mills; *Chairman*, Baron E. B. d'Erlanger; *Directors*, E. A. Hopkins, Hon. A. G. Brand, F. FitzGerald, G. M. Chamberlin.

Oldham, Ashton and Hyde Electric Tramway, Ltd., Tramway Depot, Denton, Lancs., and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tramways, Denton; T.N., 265 Ashton.] *Supt.*, A. Anderson; *Secretary*, W. E. Woodroofe; *Chairman*, E. Garcke; *Directors*, L. A. Atherley Jones, K.C., R. Whittaker, W. S. Wreathall, J. V. Kitchener (*Managing Director.*)

Paisley District Tramways Company, Tramway Depot, Paisley, and 83, Cannon Street, London, E.C. [T.N., 218 Paisley.] *Gen. Manager and Elec. Eng.*, Fred Coutts; *Traffic Supt.*, E. Jeffs; *Secretary*, A. Clements; *Con. Eng.*, H. F. Parshall; *Chairman*, O. H. Smith; *Directors*, Lord Arthur Butler, D. Johnston Smith, John Young.

Peterborough Electric Traction Company, Ltd., Lincoln Road, Peterborough, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tramways, Peterborough; T.N., 224.] *Gen. Manager*, G. Chivers; *Secretary*, S. M. Wright; *Chairman*, Lord Vaux of Harrowden; *Director*, E. A. Paris.

Plymouth, Stonehouse and Devonport Tramways Co., 16, Edgcumbe Street, Stonehouse, Devon, and Moorgate Station Chambers, London, E.C. *Manager*, G. H. Moreton; *Elec. Eng.*, J. Graham Pearce; *Sec.*, J. Barber Glenn; *Chairman*, Andrew Beattie, J.P., D.L.; *Directors*, S. Hern, J. B. Glenn (*Managing*).

Poole and District Electric Traction Company, Electrical Federation Offices, Kingsway, London, W.C.

[These Tramways have been sold to Bournemouth Corporation.]

Portsdown and Horndean Light Railway, Cosham, Hants.; Tramways and Lighting Office, Gosport, Hants., and Moorgate Station Chambers, London, E.C. [T.A., Tramways, Gosport; T.N., Municipal 16 and Nat. 3, Gosport.] *Engineer and Manager*, J. Fereday Glenn; *Secretary*, J. Barber Glenn; *Chairman*, A. Beattie, J.P., D.L.; *Directors*, J. Barber Glenn (*Managing*), S. Hern.

Potteries Electric Traction Company, Tramway Depôt, Stoke-on-Trent, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tramways, Stoke-on-Trent; T.N., 801.] *Gen. Manager and Eng.*, W. Thom; *Power and Rolling Stock Supt.*, F. J. Chapple; *Traffic Manager*, F. Hatch; *Secretary*, W. F. Herring; *Chairman*, G. Cornwallis-West; *Directors*, F. W. Chanter, S. Mear, J. V. Kitchener.

Rhondda Tramways Company, Ltd., Tramway Depot, Porth, Rhondda, and Laurence Pountney Hill, Cannon Street, London, E.C. [T.A., Tramway, Porth; T.N., 8.] *Manager and Engineer*, H. J. Nisbett; *Secretary*, L. D. H. Jacobs; *Chairman*, L. B. Schlesinger; *Directors*, J. C. Saunders, W. B. Cownie, J. T. Jervis, H. T. Barnett.

Rothesay Tramways Company, Ltd., Point House, Rothesay, and Electrical Federation Offices, Kingsway, London, W.C. *Manager*, A. Robertson; *Elec. Eng.*, H. H. Hill; *Sec.*, W. F. Herring; *Chairman*, A. C. Miles; *Directors*, W. L. Madgen, H. S. Day.

Ryde Pier Company, Ryde, Isle of Wight. *Manager*, W. D. Stanney; *Elec. Eng.*, C. Harrison; *Chairman*, G. E. Mears.

Scarborough Tramways Company, Scalby Road, Scarborough. [T.A., Electric Tramways, Scarborough; T.N., 294.] *Gen. Manager and Elec. Eng.*, W. E. Nicoll; *Chairman*, F. E. Gripper; *Directors*, V. Fowler, M. T. Whittaker, J. C. Wigham.

Sheerness and District Electric Power and Traction Company, Ltd., Electricity Works, Sheerness East, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tramways, Sheerness; T.N., 45.] *Manager & Eng.*, C. W. Durnford; *Sec.*, P. N. Gray; *Chairman*, G. J. Somerville; *Directors*, R. J. Howley, E. R. Soames.

Snaefell Mountain Railway (See Manx Electric Railway Company).

South Metropolitan Electric Tramways and Lighting Company, Ltd., 114, Church Street, Croydon, 30, High Street, Sutton, and Electrical Federation Offices, Kingsway, London, W.C. [T.N., 304 Croydon and 14 Sutton.] *Gen. Manager and Engineer*, A. V. Mason; *Supt.*, A. E. Wray; *Secretary*, S. J. Clements; *Chairman*, C. G. Tegetmeier; *Directors*, J. Devonshire, E. Garcke.

Southport Pier Co., Ltd., Southport. [T.A., Pier, Southport; T.N., 174.] *Manager*, W. H. Scott; *Chairman*, A. Skinner; *Directors*, I. R. Haworth, S. J. Fane, G. Duckworth, J. Duckworth.

Southport Tramways Company, Ltd., The Depôt, Churchtown, Southport, and Electrical Federation Offices, Kingsway, London, W.C. *Manager*, J. Lloyd; *Secretary*, H. A. Stagg; *Chairman*, C. S. Hilton; *Directors*, J. S. Raworth, Lord Vaux of Harrowden, J. V. Kitchener.

South Staffordshire Tramways (Lessee) Company, Ltd., Power Station, Downing Street, Smethwick, and Electrical Federation Offices, Kingsway, London, W.C. [T.N., 65 Smethwick.] *General Manager*, W. G. Bond; *Secretary*, E. H. Woodhall; *Chairman*, W. S. Schuster; *Directors*, J. A. Lycett, S. R. Blundstone, W. G. Bond, B. Kingsford.

Sunderland District Electric Tramways, Ltd., Fence Houses, co. Durham. [T.A., Trams, Philadelphia, Shiney Row; T.N., 21, Houghton-le-Spring.] *Resident Manager and Engineer*, G. Stratton; *Traffic Manager*, E. A. Pearman; *Secretary*, H. J. Almond; *Directors*, H. R. Hogg, Hon. R. Parker, R. Tayler.

Sutton and Howth Electric Tramway Company (owned by the Great Northern Railway, Ireland), Sutton, county Dublin, and Amiens Street Terminus, Dublin. [T.A., Railroad, Dublin; T.N., 171, Dublin, and 16 Sutton.] *Gen. Manager*, John Bagwell; *Elec. Eng.*, A. W. Whieldon; *Supt. of Line*, R. J. Moore; *Chief Eng.* F. A. Campion; *Locomotive Supt.*, G. T. Glover; *Sec.*, T. Morrison; *Chairman*, F. Vernon; *Directors*, W. P. Cairnes (*Deputy Chairman*), Sir W. Q. Ewart, Bart., W. B. Carson, H. S. Guinness, J. T. Reade, W. L. A. Goulding, Major J. C. W. Madden, R. A. Gradwell, J. Milne Barbour, T. F. Cooke, W. H. B. Moorhead, Lt.-Col. H. Plews.

Swansea Improvements and Tramways Company, 2, Rutland St., Swansea, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tramway, Swansea; T.N., 268 Swansea.] *Gen. Manager*, D. James; *Elec. Eng.*, A. Johnston; *Secretary*, S. J. Clements; *Chairman*, C. G. Tegetmeier; *Directors*, G. J. Somerville, S. E. Garcke.

Taunton Electric Traction Company, Ltd., East Reach, Taunton, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Taunton, c/o "Tramways," London.] *Manager*, B. H. Griffith; *Secretary*, S. M. Wright; *Chairman*, G. J. Somerville; *Directors*, E. Garcke.

Torquay Tramways Co., Ltd., St. Marychurch Road, Torquay. [T.A., Carsheds, Torquay; T.N., 167 Torquay.] *Registered Office*, 3, Laurence Pountney Hill, Cannon Street, E.C. *Manager and Eng.*, H. J. Nisbett; *Secretary*, L. D. H. Jacobs; *Managing Director*, W. B. Cownie.

Trafford Park Company (Tramways), Trafford Park, Manchester. [T.A., Developing, Manchester; T.N., 61, Trafford Park.] *Secretary*, C. A. Grundy; *Chairman*, Marshall Stevens; *Directors*, Sir J. Lyons, H. McNiel.

[Lines worked by the Manchester and Salford Corporations.]

Tynemouth and District Electric Traction Company, Limited, John Street, Cullercoats, Northumberland, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tram Co., Cullercoats; T.N., 17 Whitley.] *Gen. Manager*, R. Simpson; *Sec.*, C. W. Francis; *Chairman*, H. S. Day; *Directors*, J. H. Robinson, J. B. Williamson, R. J. Howley, Geo. J. Somerville.

Tyneside Tramways and Tramroad Company, Ltd., Neptune Bank, Wallsend. [T.A., Tramways, Wallsend; T.N., 84.] *Secretary & Res. Manager*, J. C. Little; *Elec. Eng.*, F. H. Briggs; *Cons. Eng.*, W. McLellan; *Chairman*, J. T. Merz; *Directors*, Lord Armstrong, J. H. Armstrong, G. E. Henderson, S. Hunter.

Wakefield and District Light Railway Company, Belle Isle, Wakefield.

[This company has been amalgamated with the Yorkshire (West Riding) Electric Tramways Co., Ltd.]

Walton-on-the-Naze Pier Tramway (Coast Development Corporation, Ltd.), The Pier, Walton-on-the-Naze. [T.A., Electricity Works, Walton-on-Naze.] *Eng.*, E. A. Lambert, A.M.I.E.E.; *Sec.*, J. F. Stovell; *Chairman*, —Hallett; *Directors*, Sir T. Sturmey Cave, P. Denny, G. Mitchell, G. Riley, H. R. Spence (*Managing*).

Wemyss and District Tramways Company, Ltd., Car Depot, Aberhill, Methill, N.B. [T.A., Tramways, Methill; T.N., 38 Leven.] *Gen. Manager*, W. T. Dawson; *Sec.*, J. O. Shepherd; *Chairman*, G. Balfour; *Directors*, W. Shepherd, G. Balfour, J. H. Guild.

Weston-super-Mare and District Electric Supply Co., Ltd., Locking Road, Weston-super-Mare, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tramways, Weston-s.-Mare; T.N., 79 & 181.] *Manager and Elec. Eng.*, G. Charlton; *Sec.*, H. A. Stagg; *Chairman*, G. J. Somerville; *Directors*, C. G. Tegetmeier, E. R. Soames.

Wolverhampton District Electric Tramways, Limited, Power Station, Downing Street, Smethwick, and Electrical Federation Offices, Kingsway, London, W.C. [T.N., 65 Smethwick.] *General Manager*, W. G. Bond; *Sec.*, C. H. Woodhall; *Chairman*, S. R. Blundstone; *Directors*, J. A. Lycett, W. G. Bond, B. Kingsford.

Worcester Electric Traction Company, Ltd., St. John's, Worcester, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tramways, Worcester; T.N., 81.] *Manager*, J. R. Groves; *Secretary*, C. W. Francis; *Chairman*, H. S. Day; *Directors*, J. A. Lycett, C. S. B. Hilton, S. E. Garcke.

Wrexham and District Electric Tramways Limited, Johnston, Ruabon, Denbighshire, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tramways, Wrexham; T.N., 9, Rhos, Ruabon.] *Manager*, A. A. Hawkins; *Sec.*, W. E. Bennett; *Chairman*, J. V. Kitchener; *Directors*, G. J. Somerville, W. S. Wreathall.

Yorkshire (West Riding) Electric Tramways Co., Ltd., Belle Isle, Wakefield. [T.A., England, Belle Isle, Wakefield; T.N., 213.] *Gen. Manager and Sec.*, H. England; *Elec. Engs.*, C. J. Jewell and E. A. Wood; *Traffic Supt.*, W. Wilde; *Chairman*, Sir Herbert S. Leon, Bart.; *Directors*, E. Schenk, B. Newgass, G. E. Leon.

Yorkshire (Woollen District) Electric Tramways Limited, Frost Hill, Liversedge, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tramways, Heckmondwike; T.N., 8 Heckmondwike.] *Secretary*, P. N. Gray; *Chairman*, E. Garcke; *Directors*, Sir Thos. Pilkington, E. A. Paris (*managing*).

TRAMWAY ASSOCIATIONS.

MUNICIPAL TRAMWAYS ASSOCIATION.

President:
Alderman H. Linsley
(chairman, Salford Corporation Tramways Committee).

Vice-President:
Peter Fisher
(general manager, Dundee Corporation Tramways).

Hon. Secretary and Treasurer:
C. J. Spencer
(general manager, Bradford Corporation Tramways), 7, Hall Ings, Bradford.

TRAMWAYS AND LIGHT RAILWAYS ASSOCIATION.

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Chairman:
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Vice-Chairman:
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Hon. Solicitor: W. Morris, Junr.

Hon. Auditor: A. W. Chambers, A.S.A.A.

Secretary:
A. de Turckheim.

Offices: Caxton House, Westminster, London, S.W. Telephone No. 2110 Victoria.

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LIST OF ELECTRIC TRAMWAYS & RAILWAYS.

PARTICULARS OF TRACK AND EQUIPMENT.

TRAMWAYS, pp. xxxi-xxxiv. RAILWAYS, p. xxxiv.

Location of Line and Name of Operating Company.	Date of Opening of First Section.	Length of Route.	Total length of Track.	Gauge.	Weight and Type of Rail.	Maximum Gradient.	Sharpest Curve.	No of Motor Cars.	No of Dynamos	No. of Engines	Type of Engines	Total Capacity Traction, kw.	Principal Contractors for Electrical Equipment
TRAMWAYS.				ft. in.	lbs.	1 in	ft. rad.						
Aberdare Urban District Trys. ..	Oct., 1913	2·9	3·3	3 6	96 G	13	45	10	2	2	V. Cp. C.	400	Lanc. Dynamo Co.
Aberdeen Corporation	Dec., 1899	14·4	27·75	4 8½	96 G	13	42·5	77	*14	14	V. Cp. C.	4,610	Macartney, McElroy & Co.
Aberdeen Suburban Trys. Co. ..	June, 1905	5	5	4 8½	95 G	28	90	9	..	..	..	..	J. G. White & Co. Brush Co.
Accrington Corporation	Aug., 1907	7	10·66	4 0	95 G	14	..	27	*8	8	..	1,888	Brush Co.
Airdrie & Coatbridge Tramway Co.	Feb., 1904	3·63	4·94	4 8½	94 G	14	210	15	..	..	..	..	Brush Co.
Ashton-under-Lyne Corporation ..	Aug., 1902	7	8·15	4 8½	96 G	10	40	21	5	5	..	400	Dick, Kerr, & Co Siemens Bros.
Aston Manor Corporation	June, 1904	6·5	11	3 6	102 G	15	36¾	48	2	2	..	1,000	Brush Elec. Co
Ayr Corporation	Sept., 1901	6	7·612	4 8½	90 G	21	45	20	*8	8	..	400	British T-H.
Barking Town Urban District ..	Dec., 1903	2·6	3·125	4 8½	100 G	25	44	9	4	3	V. Cp. C.	..	Blackwell & Co.
Barnsley & Dist. Elec. Traction Co.	Nov., 1902	3·06	4·25	4 8½	97 G	10	60	13	*6	6	..	..	J. G. White & Co. Brush Co.
Barrow-in-Furness	Feb., 1904	5·37	8·25	4 0	90 G	13	50	16	*8	..	..	..	Brush Co. Dick, Kerr, & Co.
Bath Electric Tramways, Ltd. ..	Jan., 1904	14·7	19·3	4 8½	95 G	10·7	38	40	4	4	H.T. Cp.	675	Westinghouse
Batley Corporation	Oct., 1903	6·536	10·47	4 8½	104 G	9	40	15	4	4	..	..	B. I. W. Co. British Elc Cr. Co.
Belfast City	Dec., 1905	38·5	98·67	4 8½	105 G	15	35	282	3	3	Tri. Exp.	3,000	J. G. White & Co. Westinghouse
Bessbrook—Newry (1) .. .. Bessbrook and Newry Try. Co.	Oct., 1885	3	3	3 0	41 V	80	55	2	2	1	Hyd. Turb.	..	Mather & Platt
Bexley Urban District	Oct., 1903	5·25	6·5	4 8½	90 G	14	40	16	2	2	V. Cp.	..	Dick, Kerr, & Co.
Birkenhead Corporation	Feb., 1901	13·8	24·09	4 8½	100 G	13½	40	59	6	6	V. Cp.	..	Blackwell & Co. British T-H.
Birmingham Corporation	Jan., 1904	65·56	114·55	3 6	105 G	13	40	511	..	..	..	1,475	Dick, Kerr, & Co.
Birmingham and Midland Trys. Co.	July, 1904	12·20	18·8	3 6	85 & 94 G	15	31	62	6	6	Cp.	..	Brush Co.
Blackburn Corporation	March, 1899	14·67	24·75	4 0	92 G	15	30	61	*4	4	V. Cp. C.	..	British T-H. Blackwell & Co.
Blackpool Corporation	Oct., 1885	14·75	21·38	4 8½	96 G	20	36	72	..	..	Stm. Turb	600	Elwell-Parker British T-H.
Blackpool & Fleetwood Tramrd. Co.	July, 1898	7·9	15	4 8½	56 & 70 V / 98 G	26	80	37	5	5	V. Cp.	600	Mather & Platt Dick, Kerr, & Co
Blackpool and Fylde Light Ry. Co.	Under cons.	14	14·5	4 8½	..	..	..	..	..	..	..	..	
Blackpool—St. Anne's & Lytham ..	May, 1903	7·47	14·03	4 8½	92 G	22	35	40	..	..	..	..	British T-H.
Bolton Corporation	Nov., 1899	26	47·21	4 8½	90 G	14	35	106	*12	12	V. Cp. C.	3,800	Dick, Kerr, & Co. Blackwell & Co.
Bootle Corporation	May, 1900	4·125	7·75	4 8½	95 G	20	40	55	8	8	..	..	Blackwell & Co.
Bournemouth Corporation	July, 1902	22	29·77	3 6	100 G / 66 slot	10	40	81	4	4	Cp.	1,500	J. G. White & Co.
Bradford Corporation	July, 1898	54·8	103·86	4 0	102 G	9·8	40	242	11	11	V. Cp. C.	..	Westinghouse Blackwell & Co.
Bray and Enniskerry Railway Co.	Under cons.	3·25	5	3 6	..	..	..	..	..	..	..	..	
Brighton Corporation	Nov., 1901	9·48	17·18	3 6	101 G	9	40	50	5	5	Stm. Turb.	1,000	Macartney & Co. Westinghouse Blackwell & Co.
Brighton Beach (1)	Aug., 1883	1·75	2	2 8½	35 V	100	80	8	2	1	Gas	..	Siemens Bros.
Bristol—Bristol Trys. Co.	Oct., 1895	31	57·5	4 8½	92½ G	10	30	232	6	4	V. Cp. C.	..	British T-H. and Blackwell & Co.
Burnley Corporation	Dec., 1901	11·9	22·16	4 0	102 & 107 G	9·8	35	57	*8	8	H. Cp. C.	750	British T-H.
Burton and Ashby Light Railway ..	July, 1906	10·2	12·3	3 6	90 G	11	51	20	2	2	Diesel	330	Dick, Kerr & Co. Brush Co.
Burton-on-Trent Corporation ..	Aug., 1903	6·67	9·75	3 6	90 G	11·7	40	20	4	3	V. Cp.	400	Dick, Kerr, & Co. Blackwell & Co.
Bury Corporation	June, 1903	22·5	34·42	4 8½	102¾ G	12	40	54	6	6	..	1,500	Westinghouse
Camborne and Redruth	Nov., 1902	3·75	4	3 6	83 G	15	40	8	7	7	Cp.	1,525	Dick, Kerr, & Co. British T-H.
Cardiff Corporation	May, 1902	17·25	31·82	4 8½	100 G	23	35	130	9	9	V. Cp. C.	2,200	British T-H. Dick, Kerr, & Co.
Carlisle, City of, Elec. Try. Co. ..	June, 1900	7·25	8·5	3 6	83 G	14	23	15	4	4	..	..	Dick, Kerr, & Co.
Cavehill & Whitewell Try. Co...	Feb., 1906	3·29	4·31	4 9	105 G	31	75	10	..	..	..	..	J. G. White & Co.
Chatham & District Light Rly. Co.	June, 1902	14·98	26	3 6	92½ & 105 G	9	35	47	5	4	H. Cp.	675	British T-H. Co. Brush Co.
Cheltenham and District ..	Aug., 1901	10·22	12·25	3 6	80 & 90 G	8·9	37	20	2	2	V. Cp.	..	Westinghouse
Chester Corporation	April, 1903	3·51	6·3	3 6	94 & 100 G	30	40	18	*7	7	V. Cp. C.	240	Blackwell & Co. British T-H.
Chesterfield Corporation	Dec., 1904	3·6	5·1	4 8½	96 & / 101 G	20	40	14	4	4	V. Cp. C.	800	Milnes & Co. Westinghouse Brush
Clontarf and Hill of Howth ..	July, 1900	5·5	6·5	5 3	90 & 60 G	13	34	12	..	..	..	..	W. M. Murphy & Co.
Colchester Corporation	July, 1904	6	7·94	3 6	95 G	12	43	18	8	8	V. Cp.	1,140	Dick, Kerr & Co. J. G. White & Co.
Colne Corporation Tramways ..	Nov., 1903	5·2	6·7	4 0	102 G	13	60	12	*	..	..	..	Blackwell & Co. Glover & Co.
Cork Elec. Try. & Lighting Co. ..	Dec., 1898	10	15	2 11½	83 G	14	26	35	*9	9	H. Cp. C.	1,450	British T-H. Blackwell & Co.
Coventry Corporation Tramways ..	Dec., 1895	13·25	15·40	3 6	65 G / 81 G	16	35	41	5	5	H. & V. Cp.	700	Westinghouse Blackwell & Co.
Croydon Corporation	Sept., 1901	11	19·12	4 8½	96·5 G	16	40	75	*13	13	..	2,000	British T-H. Co.
Darlington Corporation	June, 1904	4·875	8·88	3 6	90 G	14	46	16	9	7	..	..	Westinghouse

* Current from combined lighting and traction station. (1) Third rail system. † Includes 1·25 miles railless trolley line.

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ELECTRIC TRAMWAYS & RAILWAYS.—Particulars of Track and Equipment.

Location of Line and Name of Operating Company.	Date of Opening of First Section.	Length of Route.	Total Length of Track.	Gauge.	Weight and Type of Rail.	Maximum Gradient.	Sharpest Curve.	No. of Motor Cars	No. of Dynamos	No. of Engines.	Type of Engines.	Total Capacity Traction, kw.	Principal Contractors for Electrical Equipment.
TRAMWAYS—*continued.*				ft. in.	lbs.	1 in	ft. rad.						
Dartford U. D. C.	Feb., 1906	6·5	8·5	4 8½	100 G	12	35	12	4	..	..	..	British I. W.
Darwen Corporation	Oct., 1900	4·36	7·16	4 0	95 G	9	35	17	*4	4	H. Cp.	..	British T-H.
Derby and Ashbourne	..	14·5	..	4 8½									
Derby Corporation	July, 1904	13	22·06	4 0	95 G	14	46	50	3	3	Stm.Turb.	..	J. G. White & Co. Brush Co.
Devonport & District Try. Co., Ltd.	June, 1901	8·85	15·79	3 6	92 G	11	35	25	*	..	..	..	Blackwell & Co.
Devonport Corporation	June, 1901	..	7	3 6	97 G	10	50	12	..	..	..	..	Blackwell & Co.
Doncaster Corporation	June, 1902	8·25	12·52	4 8½	94 G	16	45	25	8	8	..	1,000	Blackwell & Co.
Dover Corporation	Sept., 1897	4·75	7	3 6	87 & 90 G	10	44	21	*2	2	H.CC.	..	Dick, Kerr, & Co.
Douglas—Port Soderick .. Douglas Southern Elec. Trys. Co.	Aug., 1896	3·25	3·75	4 8½	65 V	12	45	8	2	2	H. Cp.	200	Westinghouse British T-H.
Dublin & Lucan Elec. Railway Co.	March, 1900	6·5	7	3 6	50 V	20	27	16	2	2	H. Cp.C.	240	Dick, Kerr, & Co.
Dublin United Tramways Co.	May, 1896	49·8	95·26	5 3	105 G	12·3	22	365	8	7	V. Cp. C.	4,300	Dick, Kerr, & Co. Blackwell & Co. British T-H.
Dudley and Stourbridge Trys. British Electric Traction Co.	July, 1899	21·25	27·25	3 6	90 G	11	50	59	4	4	H. Cp.	..	British T-H. Blackwell & Co.
Dumbarton	Feb., 1907	13	17	4 7⅞	90 & 96	14	60	26	3	3	..	..	Dick, Kerr, & Co. J. G. White & Co.
Dundalk	Under cons.	6	6·25	3 6	97 G	10	50	12					
Dundee, Broughty Ferry, and District	Dec., 1905	5	9·125	4 8½	90 G	16·5	30½	14	3	3	V. Cp.C.	..	J. G. White & Co British T-H. Co.
Dundee Corporation	July, 1900	15·5	27·47	4 8½	90 & 100 G	10	35	68	5	5	..	..	Blackwell & Co.
Dunfermline (Fife Try. & Power Co.)	Nov., 1909	14·6	17·4	..	90 G	10	25	28	2	2	..	..	
East Ham Corporation	June, 1901	7·26	14·34	4 8½	90 & 105 G	25	40	45	5	5	H. Cp.	500	Dick, Kerr, & Co.
Eccles Corporation	May, 1902	5	7·75	4 8½	100 G	..	..	..	..	..	..	..	
Edinburgh and District	June, 1910	1·25	1·5	4 8½	100 G	21	54	4	..	..	..	..	Dick, Kerr, & Co.
Erith Urban District Council	Aug., 1905	4·7	8·4	4 8½	100 G	17	40	17	3	5	..	..	Brush Co. Westinghouse Co.
Exeter Corporation	April, 1905	4·875	7	3 6	90 G	11·5	35	20	*4	4	H. Cp.	..	Dick, Kerr, & Co.
Falkirk and District	Oct. 1905	7·81	10·5	4 0	90 G.	11·3	48	18	*	..	..	..	Bruce Peebles & Co.
Farnworth Urban District	Jan., 1902	4·33	7·16	4 8½	98 G	29	36	13	4	4	..	..	
Felixstowe Pier	Aug., 1905	0·5	0·5	3 6	36	..	..	3	..	..	..	..	
Gateshead and District	May, 1901	11·25	17·30	4 8½	90 G	8	35	53	*	..	..	..	Dick, Kerr, & Co. Blackwell & Co.
Giant's Causeway Elec. Try. Co.	Sept., 1883	8	9	3 0	42 V / 75 G	24	30	26	2	2	Hyd.Turb.	..	Siemens Bros. British T-H.
Glasgow Corporation	Oct., 1898	98·18	196·23	4 7⅞	110 G	11·93	30⅜	843	7	7	V. Cp.	14,200	British T-H. Westinghouse
Glossop Urban District	Aug., 1903	4·56	5·6	4 8½	90 G	13	40	8	4	4	V. Cp.	200	British T-H.
Gloucester Corporation Light Rly.	May, 1904	9	15	3 6	90 G	25	40	30	*2	2	Cp.	750	Brush Co. Dick, Kerr, & Co.
Gosport & Fareham Trys. Co.	Jan., 1906	7·5	11·5	4 7⅞	96 G	16	37½	22	3	3	V. Cp.C.	750	Dick, Kerr, & Co. Brush Co.
Gravesend and Northfleet	Aug., 1902	6·5	9	4 8½	87 G	11	45	18	*				
Great Crosby	June, 1900	2·5	2·5	4 8½	92½ G	..	40	14	*7	7	H. & V.Cp.	160	Dick, Kerr, & Co. Blackwell & Co.
Great Grimsby	Dec., 1901	6	11	4 8½	90 G	15	26	38	2	2	..	300	Dick, Kerr, & Co.
Greenock and Port Glasgow	Oct., 1901	7·425	14·05	4 7⅞	90 G	11	60	42	*				
Guernsey Railway Co.	Nov., 1892	3	3	3 8½	40 & 74 V / 84 G	60	60	18	2	2	H. & V. Cp.	160	Siemens Bros. British T-H.
Halifax Corporation	June, 1898	37·4	54·88	3 6	95½ G	9·5	38·6	95	*9	9	H. & V. Cp.	2,500	Electric Cons. Co. British T-H.
Hampshire Light Railway (Elec.) Co.	March, 1903	6	9	4 8½	..		..	10	*				
Hartlepool Electric Tramways Co.	May, 1896	6·72	8·3	3 6	87 & 90 G	15	35	21	4	4	V. Cp.	..	Electric Cons. Co. Dick, Kerr, & Co
Haslingden Corporation	July, 1908	3	3	4 0	100 G	10	30	..	..	..	..	..	Dick, Kerr, & Co.
Hastings and District	July, 1905	19·33	34	3 6	90 G	8	36·75	65	6	6	V. Cp.	2,100	Dick, Kerr, & Co.
Herne Bay Pier (1)	March, 1899	·75	·75	3 0	60	..	..	3	1	1	Gas	50	British T-H.
Heywood Corporation	Dec., 1905	4·25	4·25	4 8½	90 G	17	..	..	3	3	..	..	Blackwell & Co.
Houghton-le-Spring (See Sunderland Dist. Elec. Trys.)													B.I. & H.C. Co
Huddersfield Corporation	Feb., 1901	31·07	48·5	4 7⅞	98 G	11	35	96	4	4	V. Cp. C.	2,200	British T-H.
Hull Corporation	July, 1899	13·46	30·5	4 8½	94 G	20	30	160	7	7	V. Cp. C.	2,560	British T-H. Westinghouse
Ilford Urban District	Mar., 1903	6·5	11·35	4 8½	95 G	13	33·3	26	*7	7	..	1,600	British T-H. Dick, Kerr, & Co.
Ilkeston Corporation	May, 1903	3·8	4·3	3 6	90 G	12	28	13	2	1	..	..	Dick, Kerr, & Co.
Ipswich Corporation	Nov., 1903	10·8	14·87	3 6	90 G	11·5	40	36	10	10	Enclos'd	1,175	Westinghouse
Isle of Man— Manx Elc. Rly. Co. Douglas to Ramsey	July, 1893	18	35·75	3 0	62½ V	24	90	65	9	9	H. Cp.	1 300	Mather & Platt
Manx Elc. Rly. Co. Snaefell Mountain	Aug., 1895	4·5	9·5	3 6	56 V	12	90						
Isle of Thanet Trys. & Ltg. Co.	April, 1901	11	20·67	3 6	90 G	11	38	59	*6	6	3 V. Cp. / 3 H. Cp.	800	British T-H. Blackwell & Co.
Jarrow and District	Nov., 1906	2·54	3·42	4 8½	95 G	12·5	50	10	..	..	..	..	Brush Co. B.I. & H.C. Co.
Kearsley Urban District	Jan., 1902	1·75	1·75	4 8½	95 G	20	..	..	..	..	..	..	Westinghouse
Keighley Corporation	Oct., 1904	3·5	6·11	4 0	95 G	25	60	12	*4	4	V.	200	Blackwell & Co. Brush Co.
Kidderminster—Stourport British Electric Traction Co.	May, 1898	4·6	4·87	3 6	75 G	14	45	13	*5	5	Stm Turb.	..	Brush Elc.Eg.Co.
Kilmarnock Corporation	Dec., 1904	4·18	5·5	4 8½	90 G	24	45	14	*3	3	..	250	Blackwell & Co.
King's Norton & Northfield U.D.	May, 1904	5·25	8·25	3 6	105 G	15&21	100&145	..	..	..	..	..	Blackwell & Co.
Kinver	April, 1901	4	4	3 6	63 & 90 G	..	..	6					
Kirkcaldy Corporation	Feb., 1903	6·11	8·56	3 6	100 G	11	40	22	*8	6	Cp. H.S.	1,090	British T-H. Co.
Lanarkshire Tramway Co.	July, 1903	21·21	34·4	4 7⅞	96 & 101 G	9·4	37	60	4	4	3 H. Cp. / 1 V. Cp.	825	British T-H. Co.
Lancashire United Tramways Co.	Oct., 1902	39	54	4 8½	90 G	15	50	82	*5	5	V. Cp.C.	2,750	B. I. W. Co.
Lancaster Corporation	Jan., 1903	4	4·81	4 8½	90 G	8	30	12	4	4	V. Cp.	200	Greenwood & Batley, Ltd.
Leamington & Warwick Elec. T. Co.	July, 1905	3·04	6·1	3 6	65 G	12	47	12	3	3	Cp.	..	Brush Co.
Leeds City	Aug., 1897	69·02	114·62	4 8½	105 & 111 G	8·4	32	315	5 / 3	5 3	H. Cp.C. Stm.Tur	6,150	Elec. Con. Co. Greenwood & Batley, British T-H. Blackwell & Co.

* Current from combined lighting and traction station. (1) Third Rail system.

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ELECTRIC TRAMWAYS & RAILWAYS.—Particulars of Track and Equipment.

Location of Line and Name of Operating Company.	Date of Opening of First Section.	Length of Route.	Total length of Track.	Gauge.	Weight and Type of Rail.	Maximum Gradient.	Sharpest Curve.	No. of Motor Cars.	No. of Dynamos	No. of Engines.	Type of Engines.	Total Capacity Traction, kw.	Principal Contractors for Electrical Equipment
TRAMWAYS—*continued.*				ft. in.	lbs.	1 in	ft. rad.						
Leicester Corporation	May, 1904	20	37	4 8½	100 G	16	35	140	4	4	V. Cp.C.	2,500	Dick, Kerr, & Co. / Blackwell & Co.
Leith Corporation	Aug., 1905	9·08	17·9	4 8½	106·7 G	19	54	37	*11	11	..	1,600	Brush Co.
Leyton Urban District	Dec., 1906	9·125	18·5	4 8½	105 & 111 G	24	45	60	*8	8	Cp.	1,600	..
Lincoln Corporation (1)	Nov., 1905	1·75	2·96	4 8½	100 G	..	..	8	*8	8	..	645	Blackwell & Co.
Liverpool Corporation	Nov., 1898	63	119	4 8½	95 & 98 G	13	40	587	*55	55	V. Cp. Trip Exp	35,300	British T-H. / Dick, Kerr, & Co. / Westinghouse
Liverpool Overh'd Ry. (Trol. Ln. Ex.)	June, 1900	2·5	2·5	4 8½	92½ G	Nil	40	14	7	7	H. & V. Cp.	160	Dick, Kerr, & Co.
Llandudno and Colwyn Bay ..	Oct., 1907	6·60	7·573	3 6	90 G	11·5	45	18	*	..	..	..	Bruce Peebles & Co.
Llanelly and District	July, 1911	6·25	6·75	4 8½	90 G	..	..	10	*2	2	Trip. Ex.	..	
London County Council (2) ..	May, 1903	144·19	272·5	4 8½	105 G	11	45	1661	8	8	V. Cp. C.	34,000	Dick, Kerr, & Co. / Westinghouse
London United Tramways Co. ..	April, 1901	55·25	102·45	4 8½	92½ & 100 G	18	28	339	7	5	V. Cp.	3,500	British T-H. / Westinghouse. / Blackwell & Co.
Lowestoft Corporation	July, 1903	4·75	5·07	3 6	100 G	27	36	19	*5	5	Cp.	..	Blackwell & Co.
Luton Corporation Tramways (Leased to J. G. White & Co., Ltd.) ..	Feb., 1908	5·25	6·25	4 8½	95 G	11	35	12	*1	1	..	..	J. G. White & Co.
Maidstone Corporation	July, 1904	5·5	7·04	3 6½	96 G	9	35	19	6	6	..	300	Dick, Kerr & Co.
Manchester Corporation	June, 1901	119·76	202·7	4 8½	105 G	14·9	35	662	*22	22	Turb'nes	45,300	British T-H. / Dick, Kerr, & Co.
Mansfield and District Co. ..	July, 1905	10	12·25	4 8½	90 G	17	50	20	*3	3	..	..	
Merthyr	April, 1901	2·98	3·94	3 6	96 G	11	66	16	*4	4	H.S.V.	..	Dick, Kerr, & Co.
Metropolitan Electric Trys., Ltd.	July, 1904	52·5	105	4 8½	100 G	12	40	312	5	5	1 Stm. Tur	..	British T-H. / Brush Co.
Mexborough & Swinton Trys. Co.	Feb., 1907	7·75	10·75	4 8½	90 G	8·5	55	20	3	3	..	1,300	Brush Co.
Middlesbro', Stockton, & Thornaby Electric Tramways Co.	July, 1898	10·5	15·825	3 6	92½ G	17	35	60	3	4	H. & V. Cp.	900	British T-H / Blackwell & Co.
Middlesex County Council ..	Aug., 1904	25·5	51	4 8½	..	..	..	..	..	..	..	..	
Middleton Corporation	March, 1902	2·5	5	4 8½	..	..	..	..	..	..	..	..	
Middleton Electric Traction Co. ..	March, 1902	8·5	10·53	4 8½	90 G	15	49½	28	3	3	..	500	Glover & Co.
Musselburgh and District ..	Dec., 1904	6·5	8·125	4 8½	90 G	34	45	16	4	3	..	400	B. T-H. Co., Nat. Elec. Cons. Co.
Nelson Corporation	Feb., 1903	2·74	3·86	4 0	106 G	11	41	11	*4	4	..	400	Blackwell & Co. / British T-H. Co. / Brush Co.
New St. Helens & District Trys. Co.	July, 1899	18	20	4 8½	95 G	13	35	36	*4	4	V. Cp. C.	..	Westinghouse / British T-H.
Newcastle Corporation	Dec., 1901	31·25	61	4 8½	101 G	11	35	192	5	5	V. Cp.	..	Westinghouse / British T-H.
Newport (Mon.) Corporation ..	April, 1903	7·5	14·35	4 8½	98 G	10·5	40	44	5	5	V. Cp.	1,750	Westinghouse
Northampton Corporation	July, 1904	5·5	9·16	3 6	90 & 96 G	18	50	26	3	3	V.C.C.	520	Dick, Kerr, & Co. / Brush Co.
North Shields Tramways Co. ..	March, 1901	..	7·75	3 6	90 G	10	36	22					
North Staff. Trys. (*vide* Potteries)													
Norwich Electric Tramways Co. ..	July, 1900	14·5	19·25	3 6	65½ & 90 G	12·6	38	52	4	4	H.T.Cp.	800	Westinghouse / Blackwell & Co.
Nottingham Corporation	Jan., 1901	19·75	37·5	4 8½	107 G	11·5	40	135	3	3	..	..	British T-H. / Dick, Kerr, & Co.
Nottinghamshire & Derbyshire Tramways Co.	Under cons.	13·5	..	4 8½									
Oldham, Ashton & Hyde Trys. Co.	June, 1899	8·888	11·183	4 8½	97 G	11	28	46	*3	3	V. Cp. C.	..	British T-H.
Oldham Corporation	Dec., 1900	23·42	36·5	4 8½	100 & 102 G	10·5	40	92	*4	4	..	2,220	Dick, Kerr, & Co.
Paisley & District Tramways Co.	June, 1904	15	25	4 7½	90 G	10	34	58	..	..	..	..	
Perth Corporation	Oct., 1905	4·846	6·75	3 6	90 G	16	25	12	5	5	Cp.	500	Blackwell & Co.
Peterborough Elec. Traction Co. ..	Jan., 1903	5·33	6·71	3 6	94 G	31	35	14	..	..	..	..	Blackwell & Co. / Dick, Kerr, & Co.
Plymouth Corporation	Sept., 1899	7·75	15	3 6	92 G	9	35	42	3	3	V. Cp.	..	Elec. Cons. Co. / Westinghouse
Plymouth, Stonehouse, and Devonport	Nov., 1901	1·5	3·62	3 6	84 G	11	34	14	..	..	..	..	Blackwell & Co. / Dick, Kerr, & Co.
Pontypridd Urban District ..	March, 1905	5·5	8·6	3 6	96 & 100 G	10	27·6	26	4	4	V.C.Cp.	450	B. I. W. Co. / Blackwell & Co.
Portmadoc & South Snowdon Rly.	Under cons.	13·25	15	1 11½	41	28	200	6	..	..	..	..	
Portsdown & Horndean Tramway	March, 1903	6	7·5	4 7½	96 G	16	40	16	2	2	Oil	200	Dick, Kerr, & Co. / Brush Co.
Portsmouth Corporation	Sept., 1901	15·75	30·83	4 7½	96 & 100 G	17	35	100	5	4	V. & H.Cp.	2,075	Macartney & Co. / Dick, Kerr, & Co.
Potteries Electric Traction Co. ..	May, 1899	31·67	41·48	4 0	87, 90, 100, & 110 G	11	45	110	8	8	H.Cp. / V.Cp.	2,275	Dick, Kerr, & Co. / Blackwell & Co.
Preston Corporation	June, 1904	10·54	17·2	4 8½	95 G	16	28	33	2	2	H.Cp.	600	Dick, Kerr, & Co.
Radcliffe Urban District ..	April, 1905	5	6·5	4 8½	100 G	15	40	..	3	2	V. Cp.	..	Mather & Platt
Rawtenstall Corporation	May, 1909	12	15·9	4 0	100 G	15	38	24	*3	3	..	850	Westinghouse
Reading Corporation	July, 1903	7·44	13·175	4 0	96 G	16	35	36	4	4	V. Cp.	400	Blackwell & Co. / Dick, Kerr, & Co. / Westinghouse
Rhondda Tramways Co.	July, 1908	17·5	24·5	3 6	95 G	15	45	50	8	4	..	1,400	British T-H. / Brush
Rochdale Corporation	May, 1902	19·58 (A)	22·74 (A)	4 8½	103½ G	11·7	30	69	..	..	..	..	British T-H. / Dick, Kerr, & Co. / Brush Co.
Rotherham Corporation	Jan., 1903	10	12	4 8½	100 G	9·5	45	36	*6	6	H.S.Cp.	1,485	Dick, Kerr, & Co.
Rothesay	June, 1902	4·81	9·68	3 6	94 G / 77 G	24	34	20	3	3	V. & Oil	250	Dick, Kerr, & Co. / Westinghouse
Ryde Pier, Isle of Wight Ryde Pier Co. (3) ..	March, 1886	·5	1	4 8½	30 & 34 V	..	..	4	2	2	Gas	..	Siemens Bros.
Salford Corporation	Oct., 1901	41·25	75·79	4 8½	103 G	20	47	200	*8	9	V. Cp. C.	2,400	Westinghouse / Mather & Platt
Scarborough Tramways Co. ..	May 1904	5	7·75	3 6	90 G	10·5	35	22	2	2	Stm. Turb.	..	Brush Elec. Co.
Sheerness and District	April, 1903	2·5	2·704	3 6	94 G	43	40	8	6	5	V. Cp. C.	100	Siemens & Halske / Brush Co.
Sheffield Corporation	Sept., 1899	40	77·84	4 8½	110 & 116 G	9·5	35	279	7	7	1 H.Cp. / 6 V.Cp.	5,725	British T-H.

* Current from combined lighting and traction station. (1) G.B. surface contact system. (2) Mainly Conduit system, but there are now several Trolley lines. Besides the electric lines the London County Council has also 4·45 route miles of horse tramways. (3) Third rail system. (A) Not including 17·1 miles track leased.

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ELECTRIC TRAMWAYS (contd.).	Date of Opening of First Section.	Length of Route.	Total Length of Track.	Gauge.	Weight and Type of Rail	Maximum Gradient.	Sharpest Curve.	No. of Motor Cars.	No. of Dynamos	No. of Engines.	Type of Engines.	Total Capacity Traction, kw.	Principal Contractors for Electrical Equipment.
				ft. in.	lbs.	1 in	ft. rad.						
Shipley Urban District	May, 1902	6	10	4 0	98 G	15	..	..	4	3	..	..	British T-H.
Soothill Nether U.D.C. & Dewsbury & Ossett Corporations	Nov., 1908	3·125	4·45	4 8½	90 G	13	50	8	*	..	..	..	Nat. Elec. Cons. Co.
Southampton Corporation	Jan., 1899	10·25	18·5	4 8½	96 G	13	45	70	6	6	H. Cp. C.	1,000	Westinghouse
Southend Corporation	July, 1901	7·01	10·24	3 6	90 G	18	48	31	*6	6	V. Cp. Con.	2,075	British T-H.
Southend Pier (1) Southend Corp.	Aug., 1890	1·25	1·25	3 6	60 G	Lev.	..	25	..	..	..	..	British T-H.
South Metropolitan Elec. Try. Co.	Feb., 1906	13·09	26	4 8½	95 G	16	42	51	*8	6	Stm Tbs	1,650	Dick, Kerr & Co, Brush Co.
Southport Corporation (Z)	July, 1900	13·5	10·75	4 8½	87 & 90 G	25	45	26	*3	3	H. Cp.	600	Dick, Kerr, & Co.
Southport Electric Tramway Co.	July, 1901	8·17	12·52	4 8½	87 G	Nil	40	21	*				
Southport Pier	1905	1	1	4 0	..	..	..	3	..	..	..	..	Westinghouse
South Shields Corporation	March, 1906	5·7	10·25	4 8½	95 G	15	35	35	2	2	V. Cp. C.	1,100	Dick, Kerr & Co.
South Staffordshire	Jan., 1893	18·98	29·5	3 6	97 & 90 G	17	46	46	3	3	C.H. Cp.	..	Blackwell & Co. E. C. C
Stalybridge, Hyde, Mossley, and Dukinfield	May, 1904	23·75	27·75	4 8½	99 G	9	27½	60	9	3 Marine 2 Stm. tur.		7,900	Dick, Kerr, & Co.
Stockport Corporation	Aug., 1901	16	27·62	4 8½	96 G	10·8	35	50	*5	5	Cp.	1,000	Macartney & Co. Dick, Kerr, & Co.
Sunderland Corporation	Aug., 1900	10·92	20·35	4 8½	96 G	12	36	70	*4	4	..	936	Dick, Kerr, & Co.
Sunderland District Electric Trys.	June, 1905	14·27	15·97	4 8½	90 G	11	40	33	*				
Sutton & Howth (G.N.R., Ireland)	June, 1901	5·3	6	5 3	72 B	16·7	300	11	3	3	V. Cp.	500	British T-H. Westinghouse
Swansea Tramways Company	June, 1900	12·43	18·54	4 8½	84 & 86 G	14	45	65	3	3	H. Cp. C.	620	British T-H.
Swindon Corporation	Sept., 1904	3·7	4·4	3 6	105 G	15	37	12	5	4	..	600	Dick, Kerr & Co.
Taunton Electric Traction Co.	Aug., 1901	1·66	2	3 6	90 G	25	35	6	*	..	..	..	Blackwell & Co.
Torquay Tramways	April, 1907	6·95	11·125	3 6	90 G	12	45	18	*2	1	..	..	
Trafford Park Estates, Ltd. (Trys.)	July, 1903	2·5	2·75	4 8½	100 G	Nil	35	7	4	4	Tand Cp.	..	Westinghouse
Tynemouth and District	March, 1901	4·21	7·83	3 6	90 G	10	30	21	*3	3	..	..	Blackwell & Co.
Tyneside Tramways & Tramroads Co.	Sept., 1902	10·97	16·23	4 8½	95 G	10	40	24	*				
Wakefield & District Lgt. Rlys. Co.	Aug., 1904	24·69	40·382	4 8½	96 G	15·5	40	69	5	5	..	1,200	Dick, Kerr, & Co.
Wallasey Corporation	March, 1902	8·75	19·86	4 8½	98 G	14	40	61	*3	3	V. Cp. C.	1,100	Lanc. Dynamo Co. Blackwell & Co.
Walsall Corporation	Jan., 1904	13·5	19·5	3 6	90 & 92 G	18·5	32	39	*8	8	V. Cp. C.	1,730	British T-H. Electric Cons. Co.
Walthamstow U.D.C. Light Rly.	June, 1905	9·14	12·53	4 8½	100 G	18	40	38	*15	15	Gas	1,560	Westinghouse
Walton-on-Naze Pier	Aug., 1898	·5	·5	3 6	36 V	..	..	3	3	2	..	100	
Warrington Corporation	April, 1902	6·5	9·6	4 8½	90 G	27	50	21	*6	6	V.C.	500	Blackwell & Co. British T-H.
Wemyss and District	Aug., 1906	7·5	9	3 6	95 & 97 G	18	85	17	3	3	2 V. Cp.	..	Bruce Peebles & Co Brush Co.
West Bromwich Corporation	Dec., 1902	7	12·5	3 6	98 G	20	49	29	8	8	Turb'nes	750	Dick, Kerr, & Co. B. I. W. Co.
West Ham Corporation	Feb., 1904	15·5	30·05	4 8½	100 G	18	40	118	*3	3	V.C. Cp.	1,500	Brush Co.
Weston-super-Mare	May, 1902	2·39	3·5	4 8½	90 G	25	40	12	5	4	Cp.	..	Blackwell & Co. British T-H. Brush Co.
Wigan Corporation	Jan., 1901	30·9	45·42	3 6 / 4 8½	105 G	12	45	67	*8	8	..	740	Blackwell & Co.
Wolverhampton Corporation (3)	April, 1902	13·5	21·5	3 6	91 G	15	37·5	49	*10	10	H. & V.C. & Turb's	2,900	British T-H. Electric Cons. Co.
Wolverhampton District	April, 1900	14·75	19	3 6	90 G	20	40	30	*4	..	..	..	B.I.W. & B.T-H
Worcester Electric Traction Co.	Feb., 1904	5·86	8·58	3 6	94 G	13	45	15	*3	3	..	..	Westinghouse Brush Co. Dick, Kerr, & Co.
Wrexham and District	April, 1903	4·44	6·16	3 6	96 G	9·11	50	10	*6	..	..	..	British T-H. Brush Co.
Yarmouth Corporation	June, 1902	10	14·4	3 6	90 & 95 G	27	48	35	3	3	Comp.	..	Brush Co. B.I.W. Co.
York Corporation	Jan., 1910	6	9·9	3 6	100	18	40	18	*8	8	V.C.	..	Dick, Kerr, & Co. Brush Co.
Yorkshire Woollen District	Feb., 1903	22·25	36	4 8½	94 & 100 G	8	30	69	*	..	..	..	Brush Co. Dick, Kerr, & Co.
RAILWAYS.													
LONDON AND VICINITY:													
Central London Rly. Co. (1)	July, 1900	6·5	13	4 8½	100 V	30	..	68 M. 172 T.	6	6	H. Cp. C.	..	British T-H.
City & South London Rly. Co. (1)	Dec., 1890	7·25	14·75	4 8½	60 V / 80 V	30	120	52 L. 142 T	7	7	2 H.C. 4 V.C.	..	Mather & Platt Elec. Cons. Co British T-H.
East London Railway (2)	April, 1913	5·75	11·5	4 8½	90 B	..	..	(c)	..	..	..	..	
Gt. Northern & City Rly. Co. (2)	Feb., 1904	3·5	7·75	4 8½	85 V	52	660	35 M 45 T	6	8	V. Cp. C.	..	British T-H.
Great Western Railway (Hammersmith and City line.)	Nov., 1906	4·9	10·5	4 8½	97½ B	60	400	40 M. 80 T	10	10	V. Cp.	..	British T-H. Elec. Con. Co.
London & North Western Rly. (Euston-Watford line)	Under cons.	..	..	4 8½	..	..	..	..	..	..	..	..	
London & South Western Rly. (Kingston Loop, etc.)	Under cons.	..	..	4 8½	..	..	..	..	..	..	Turbine	..	Dick, Kerr & Co Westinghouse
London, Brighton, and South Coast Railway (4) (Extension in progress)	Dec., 1909	22	70	4 8½	..	..	..	16 M. 8 T.	(d)	..	..	..	Allgemeine El. Ges British T-H. Blackwell & Co.
London Electric Railway Co.: Baker St. & Waterloo Ry. (2)	March, 1906	5·5	11·0	4 8½	90 B	60	330	86 M. 72 T.	(a)	..	..	..	Westinghouse British T-H.
Charing Cross—Hampstead Railway (2)	June, 1907	8	16·5	4 8½	90 B	33	330	60 M. 90 T.	(a)	..	..	..	Westinghouse British T-H.
Great Northern, Piccadilly & Brompton Rly. (2)	Dec., 1906	9·25	18·5	4 8½	90 B	33	330	72 M. 144 T.	(a)	..	..	..	Westinghouse British T-H.
Metropolitan Railway (2)	Jan., 1905	26	59	4 8½	86 B	44	363	86 M. 172 T.	4	4	Turbine	..	Westinghouse British T-H.
Metropolitan District Railway (and running powers) (2)	July, 1905	41	80·46	4 8½	86 B	40	330	234 M. 286 T.	(a)	..	Turbine	..	British T-H. Westinghouse
Waterloo and City Rly. Co. (1)	Aug., 1898	1·5	3	4 8½	87 B	30	321	17 M. 12 T.	6	6	V. C.	..	Siemens Bros. Dick, Kerr & Co.
PROVINCES:													
Lancashire and Yorkshire (2) (Extensions in progress)	March, 1904	31	65	4 8½	86 B	85	840	88 M. 52 T.	6	5	1 V.C. 4 H.C.	..	Dick, Kerr, & Co
Liverpool Overhead Rly. Co. (1)	March, 1893	6·5	13·05	4 8½	60 V	40	429	46 M 7 T	7	7	H. Cp. V. Cp.	..	Electric Cons. Co. Dick, Kerr, & Co.
Mersey Railway (1)	April, 1903	4·5	9	4 8½	86 B	27	528	24 M. 87 T.	5	5	V. Cp.	..	Westinghouse Elec. & Mfg. Co
Midland Rly.—Morecambe and Heysham Branch (4)	June, 1908	9·75	19·5	4 8½	..	..	..	8 M. 6 T.	4	4	Gas.	..	Westinghouse Siemens Bros.
North Eastern Railway (1)	March, 1904	35	80	4 8½	90 B	55	792	60 M. 50 T.	(b)	..	..	..	British T-H. Co.

* Power from combined lighting and power station. (1) Third rail system. (2) Third and fourth rails system. (3) Lorain surface contact system. (4) Single phase.
(a) Power supplied by Chelsea Power Station (80,000 H.P.) (b) Power purchased from the Newcastle-upon-Tyne Electric Supply Company, Limited.
(c) Rolling stock supplied by Metropolitan Railway. (d) Power supplied by London Electric Supply Corporation. M—Motor Cars. T—Trail Cars.
(Z) Not including 9 miles owned but leased.

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Manufactured by Bridgeport Brass Co.,

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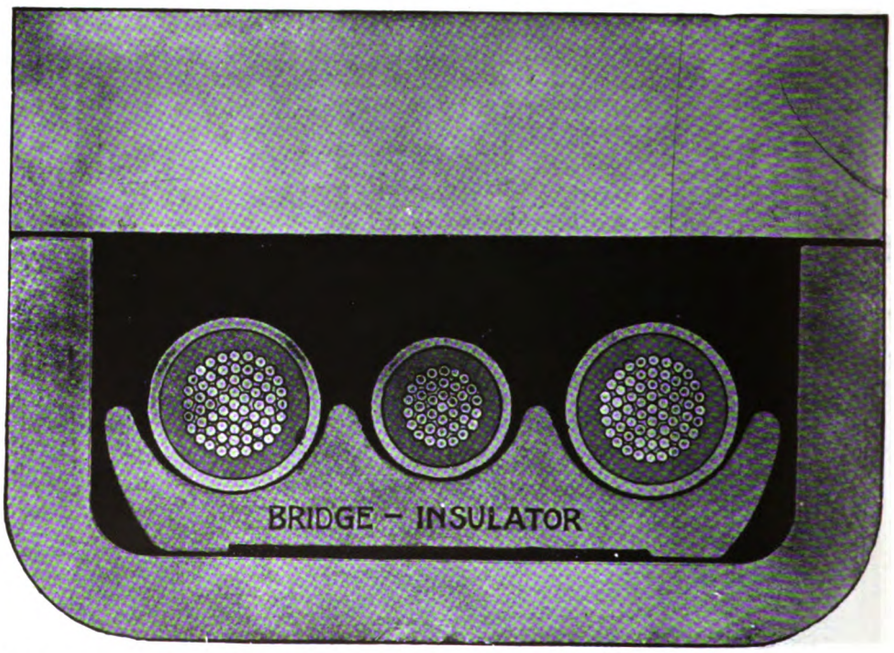

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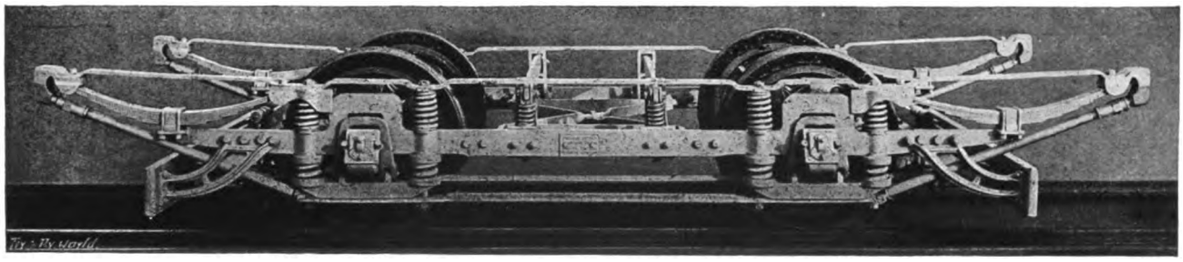

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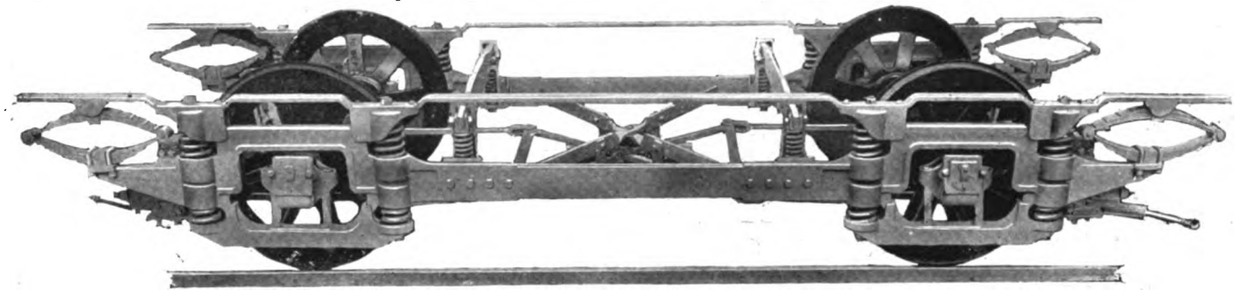

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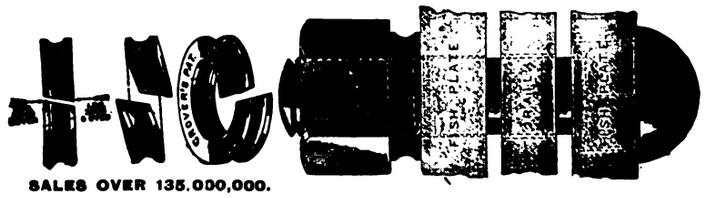

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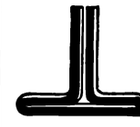

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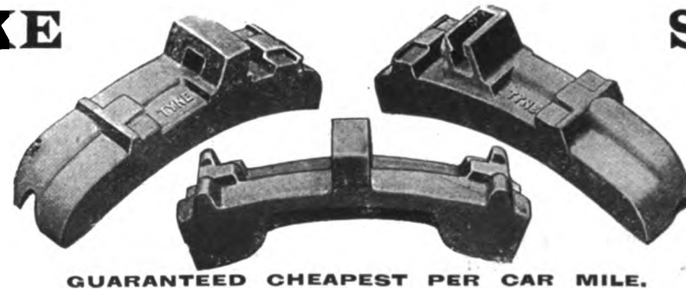

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3½-h.p. 3-ton Tipping Waggon, one of two supplied to Wilson, Sons & Co., Ltd., Santos, Brazil.

The Albion Company are recognised specialists in the construction of vehicles for Public Service work. Not only are Albions eminently reliable, but their extraordinary length of life means a very moderate depreciation on capital cost, and their low cost of upkeep effects a direct and immediate saving to the rates. This fact explains why so many Government Departments and Municipal Bodies have long ceased to experiment and now constantly choose Albions.

Load capacity: 10 cwts. to 4 tons.

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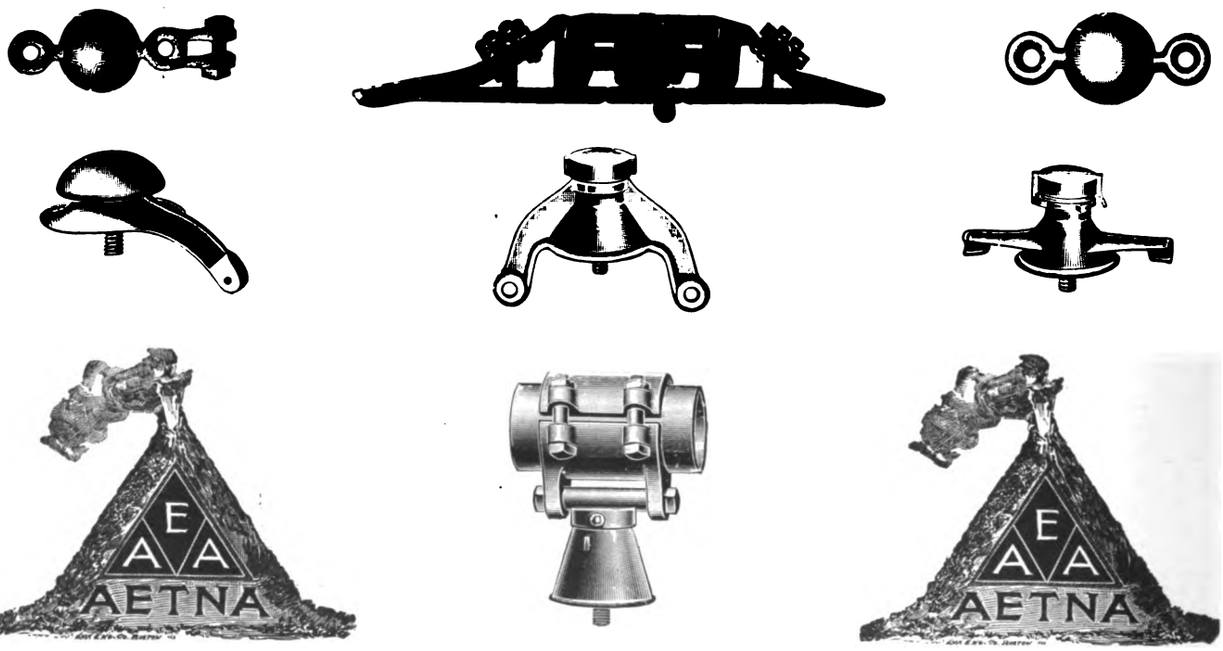

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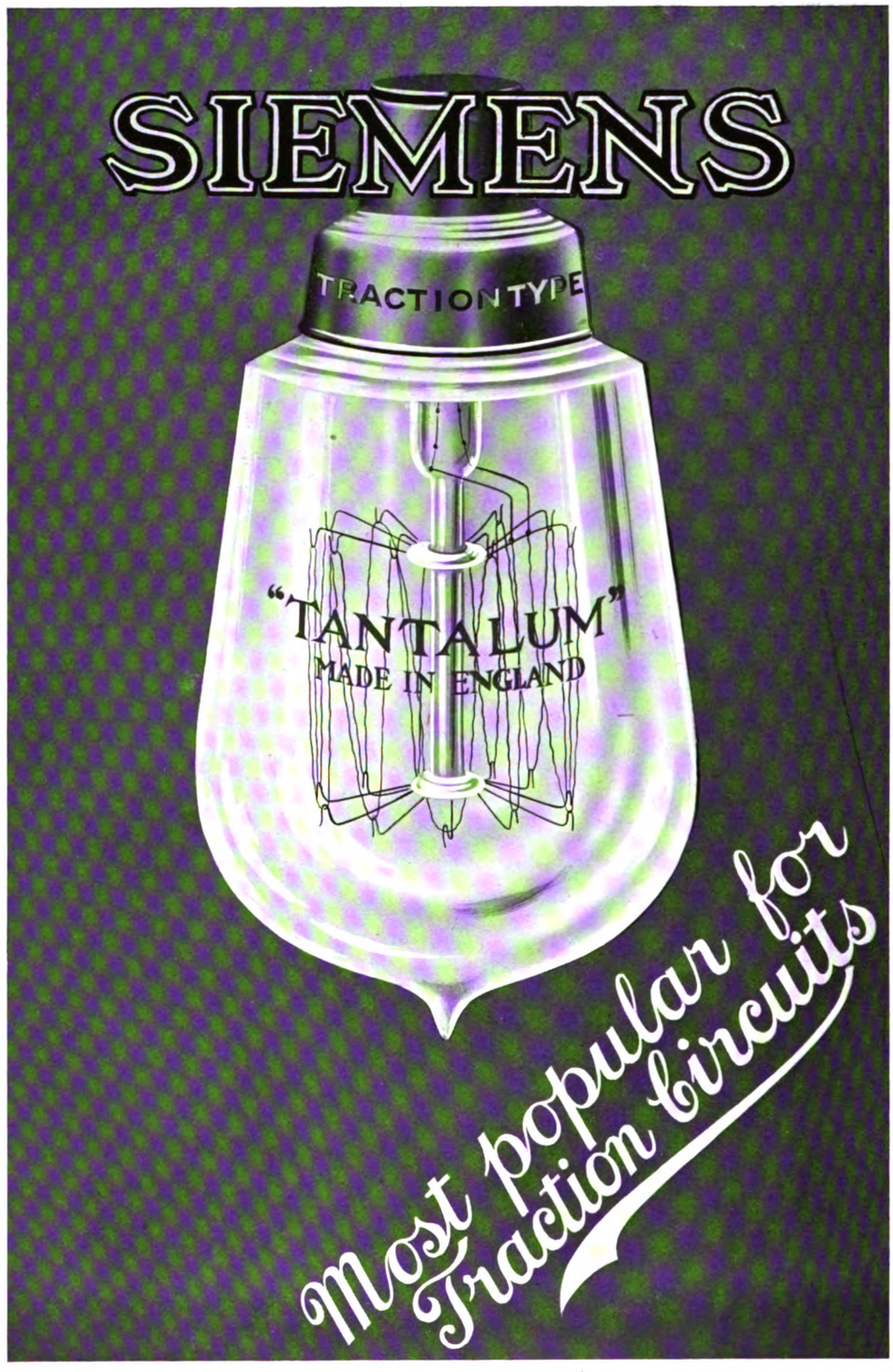

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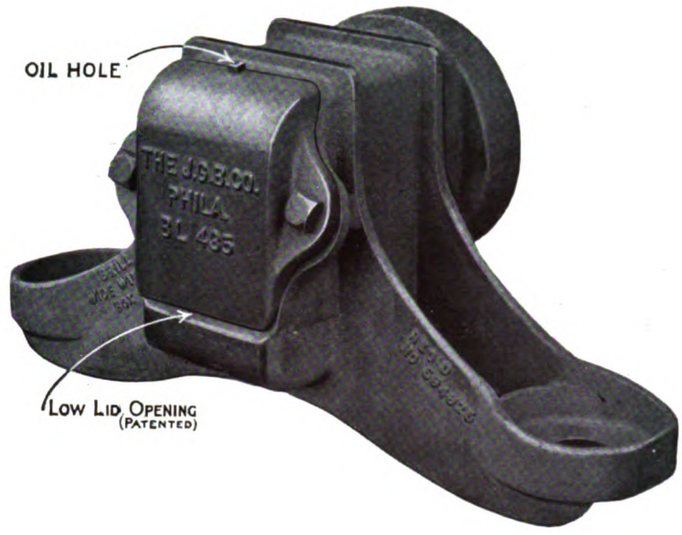

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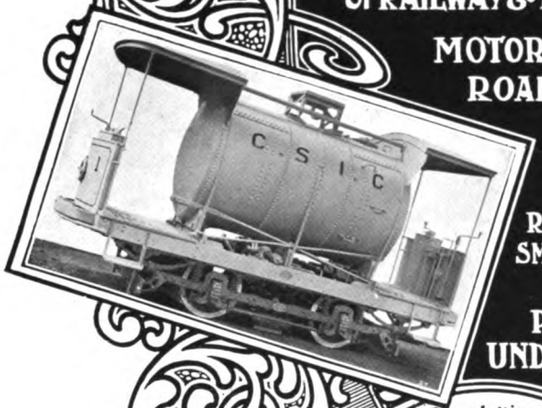

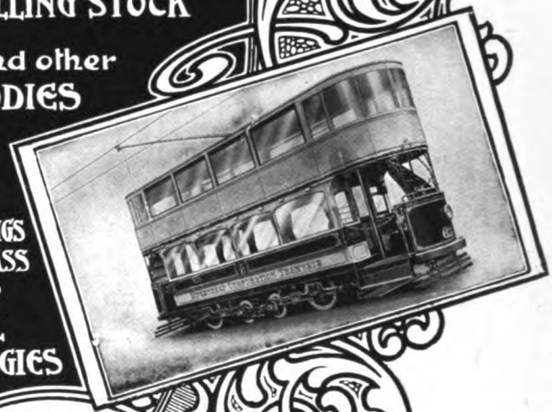

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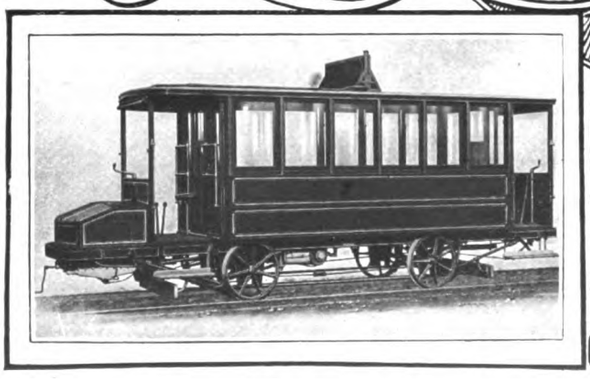

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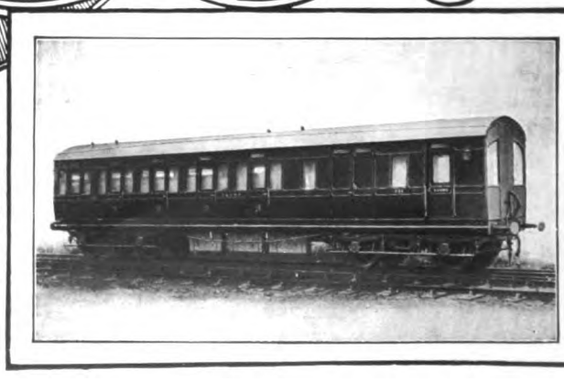

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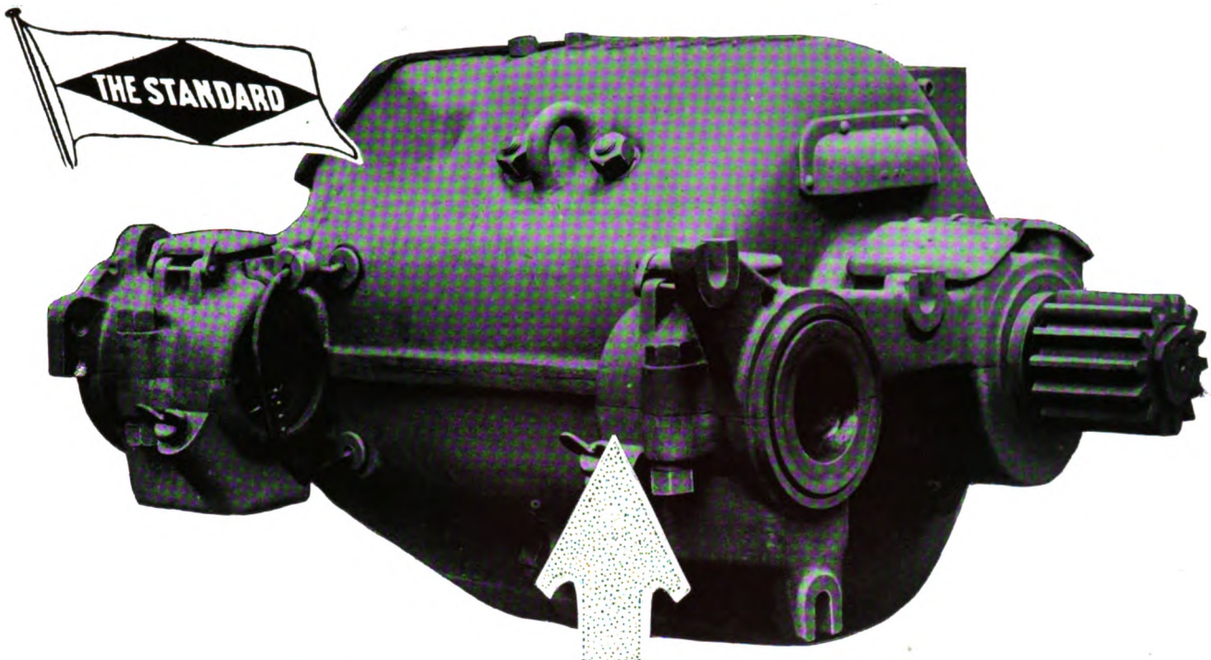

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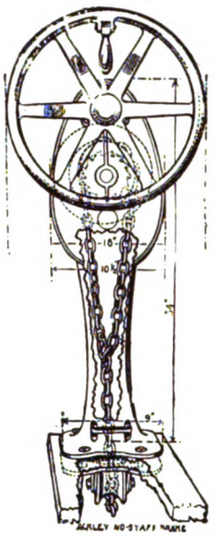

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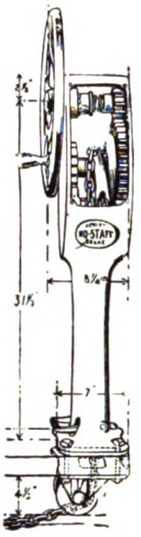

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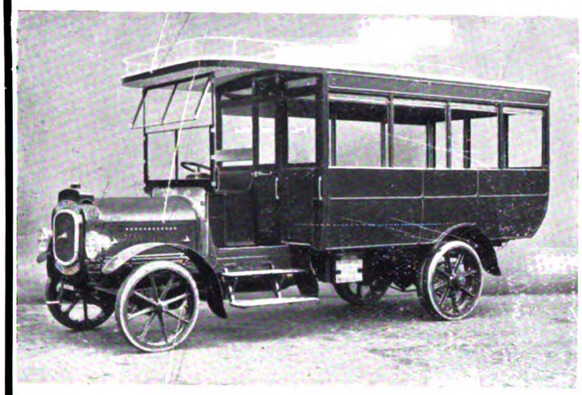

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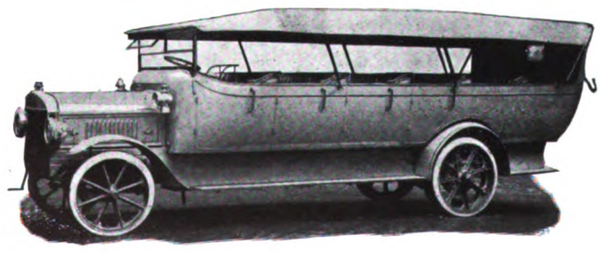

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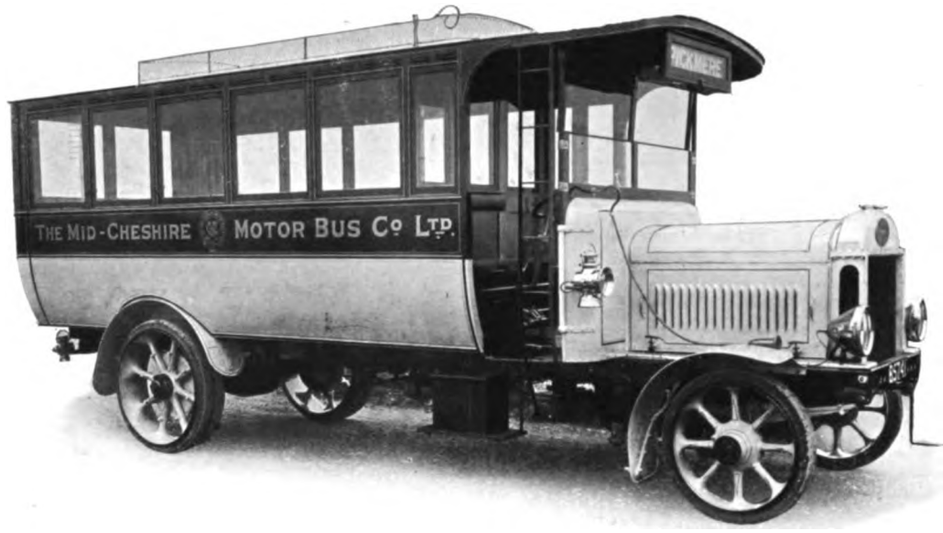

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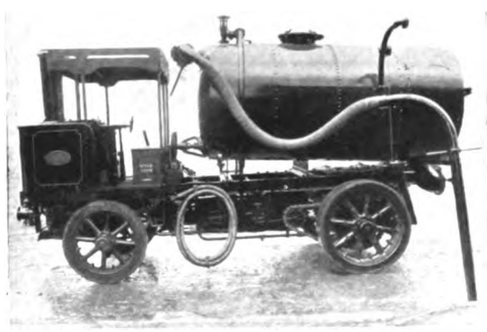

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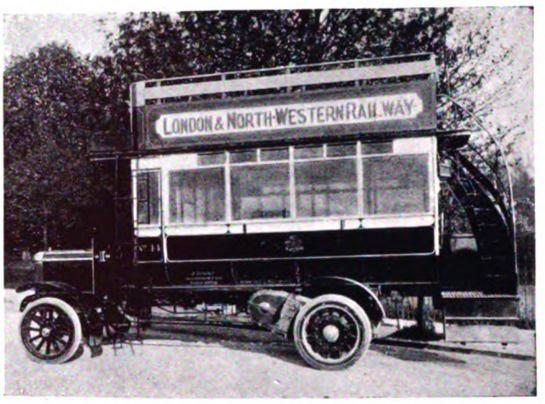

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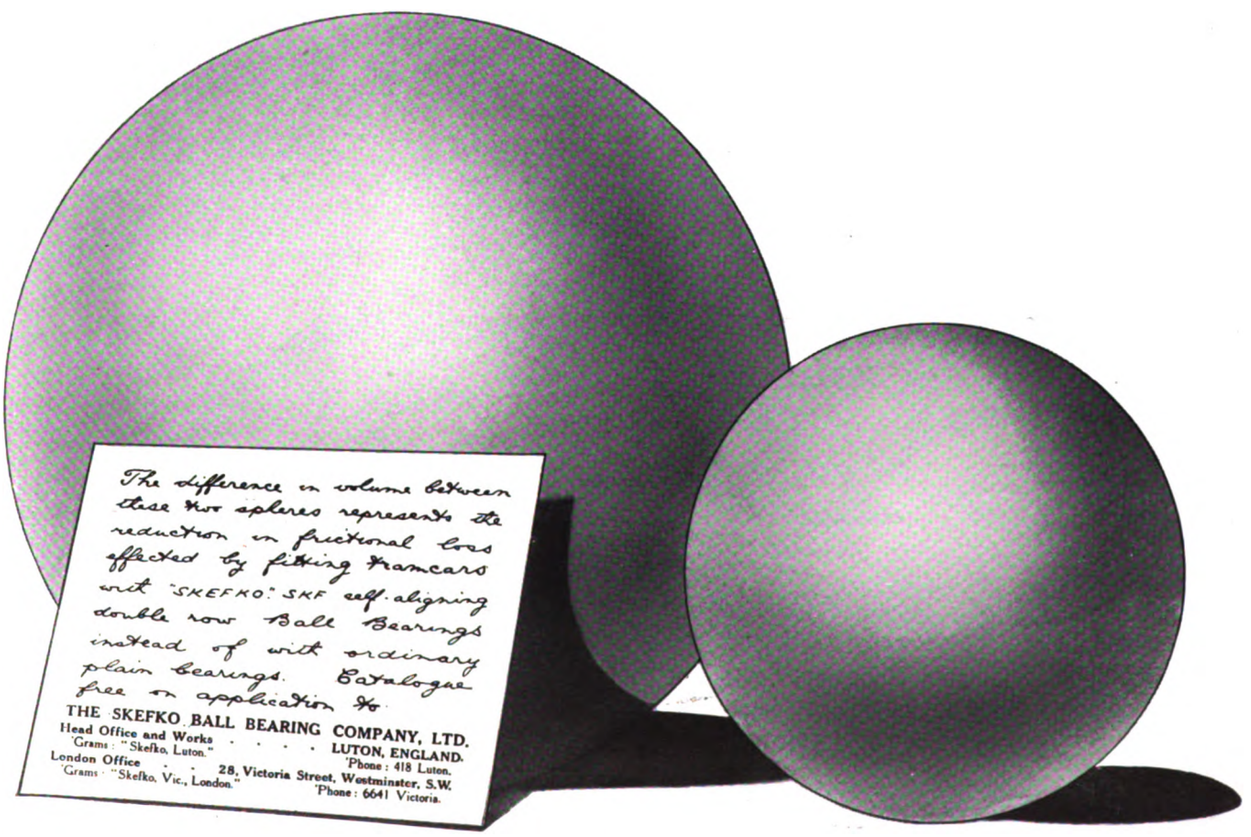

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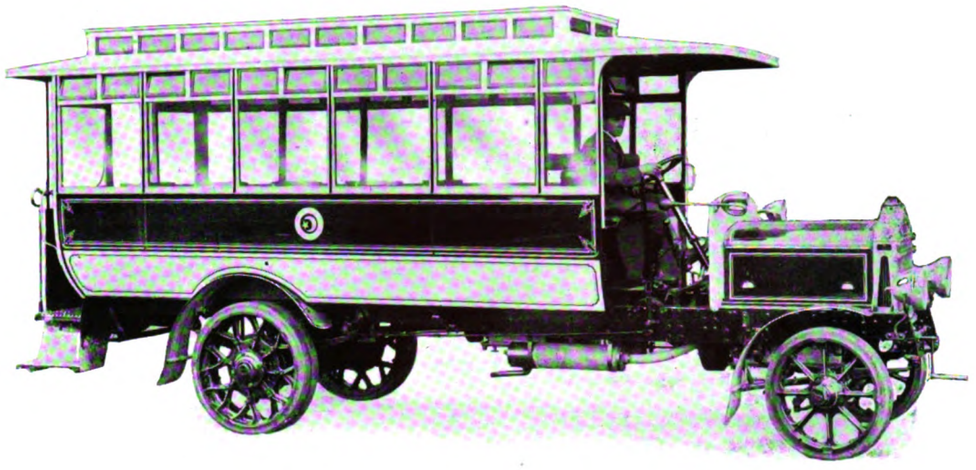

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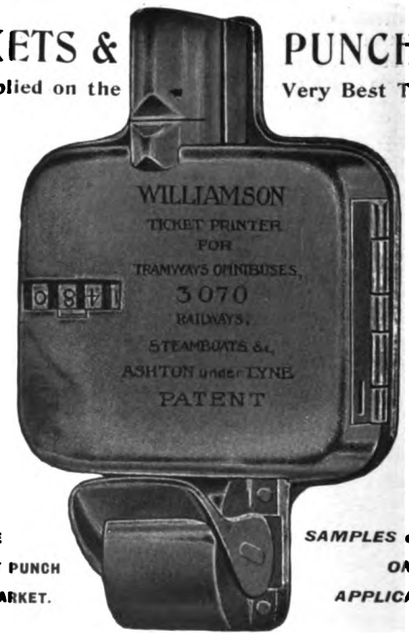

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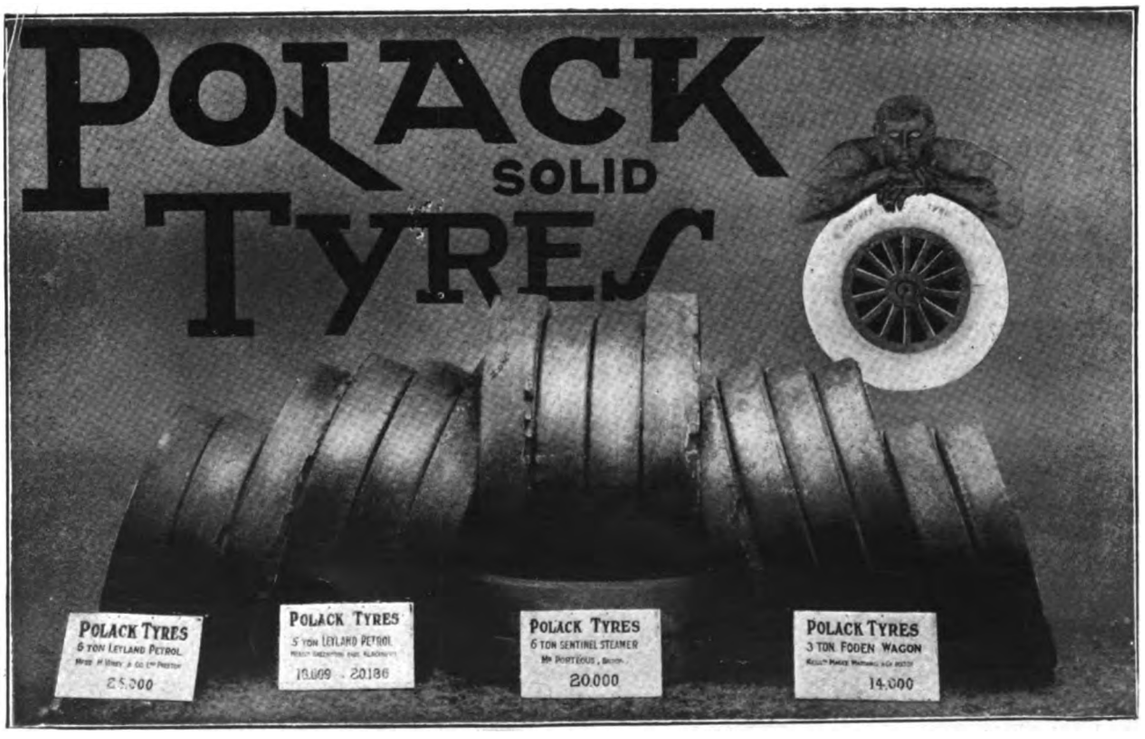

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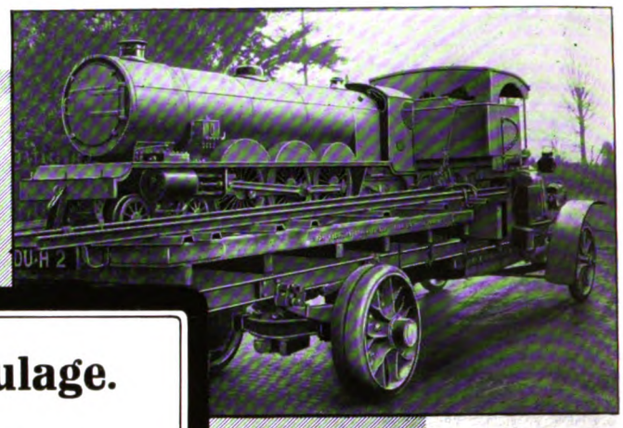

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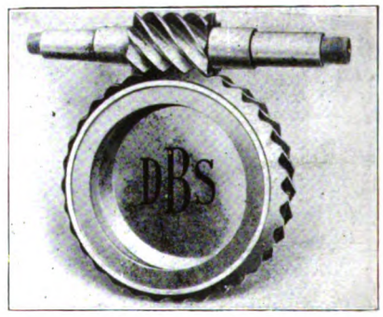

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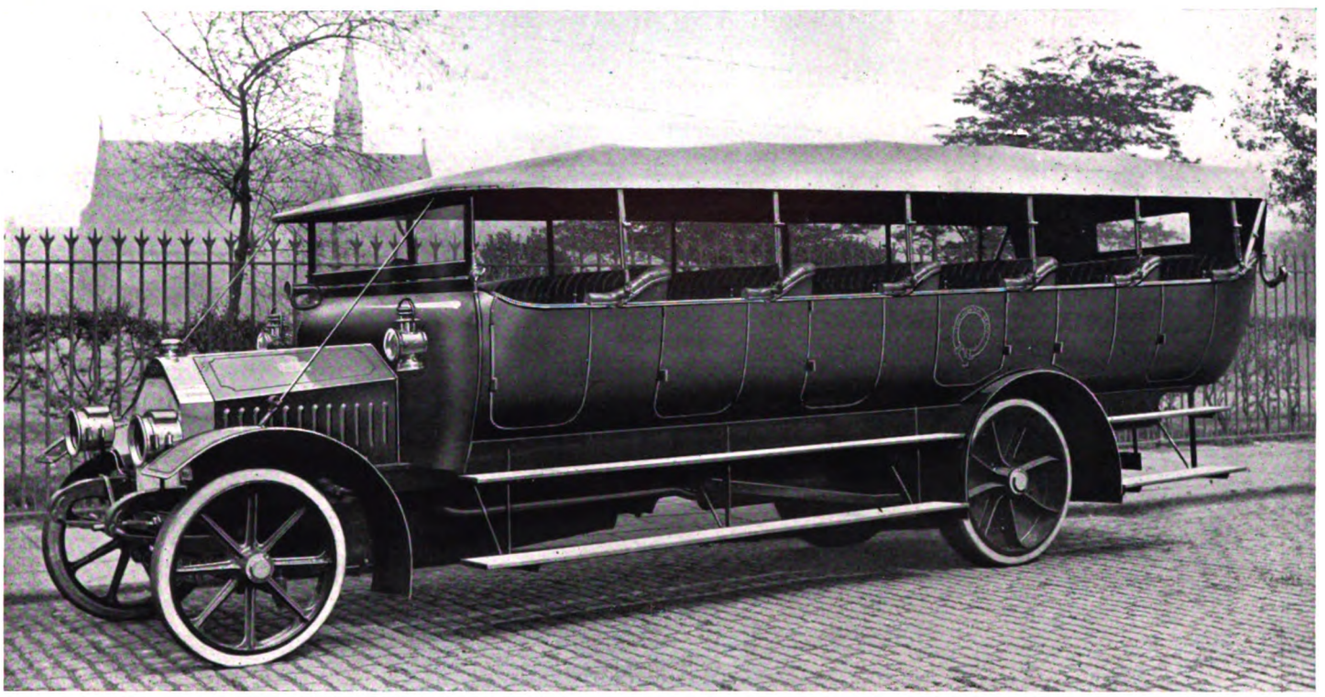

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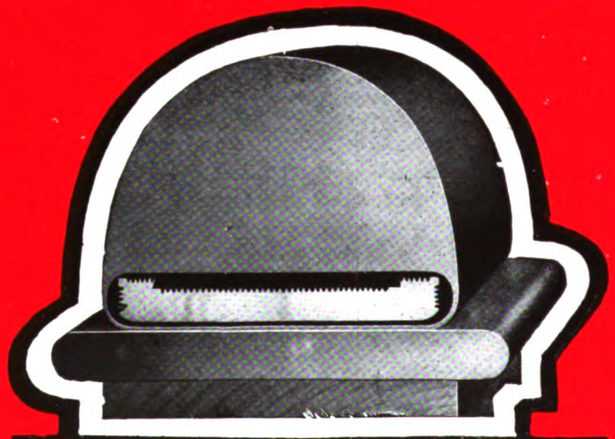

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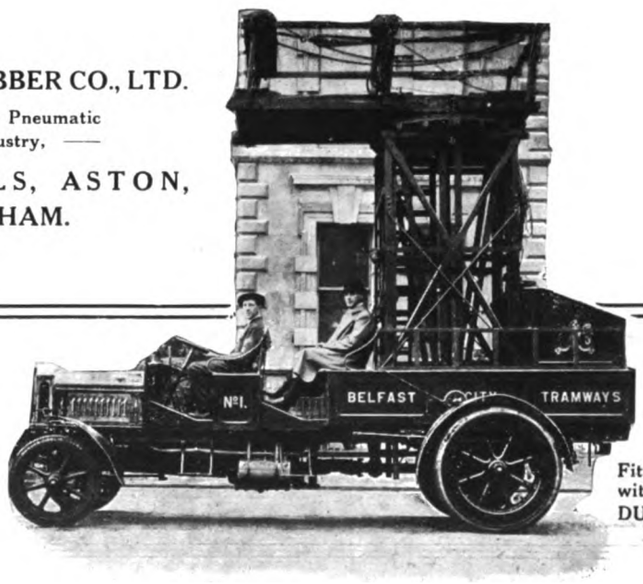

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NEWCASTLE-on-TYNE:	*50, Grey Street.*

HIGHEST RENTS PAID for sole rights of advertising on any system of Tramways or Omnibuses.
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Wakefield and District Light Railway.
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Delhi Electric Tramways.
Mandalay Electric Tramways.
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Newcastle-on-Tyne Corporation Tramways.
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Cork Electric Tramways and Lighting Co., Ltd.
Isle of Thanet Electric Tramways Co., Ltd.
Keighley Corporation Tramways.
Keighley Corporation Motor 'Buses.
Burton-on-Trent Corporation Tramways.
Scarborough Electric Tramways Company, Ltd.
Aberdeen Suburban Tramways Co.
Paisley & District Tramways Co.
Hastings & District Electric Tramways Co., Ltd.
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Doncaster Corporation Tramways.
Cardiff Corporation Tramways.
Plymouth Corporation Tramways.
Gloucester Corporation Light Railways.
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Stockport Corporation Tramways.
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MANUFACTURERS OF

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ADVERTISING TABLETS.

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BABCOCK & WILCOX LTD.

COAL HANDLING CRANES.

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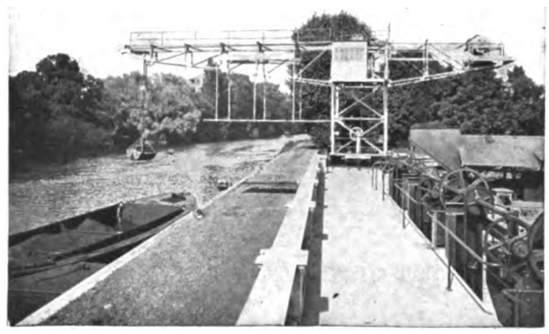
Goliath Cranes.

Winches.



Luffing Jib Cranes.

Portal Cranes.

Capstans.

BABCOCK & WILCOX 2-TON ELECTRIC COALING CRANE

ELECTRIC TRANSPORTERS.

Head Office: ORIEL HOUSE, FARRINGDON ST., LONDON, E.C.

Telegrams: "BABCOCK, LONDON." **Works: RENFREW, SCOTLAND.** Telephone No. 6470 CITY (8 Lines).

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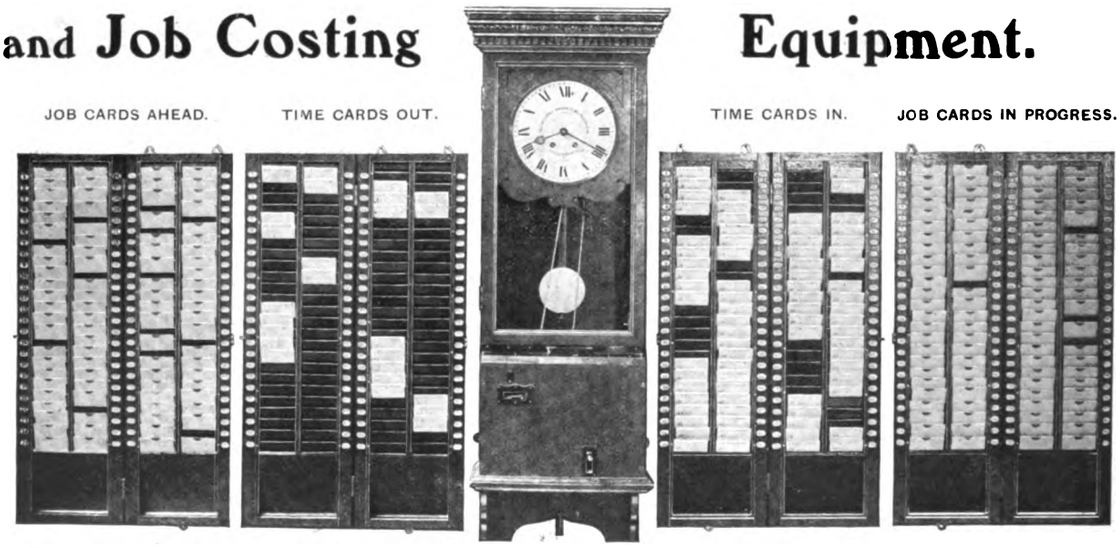
JOB CARDS AHEAD. TIME CARDS OUT. TIME CARDS IN. JOB CARDS IN PROGRESS.



The Illustration shows the Recorder, together with a set of Card Racks, for Time Keeping and Job Costing.

To secure accurate records of the time taken on different jobs, a mechanical check controlled by a good clock is an absolute necessity, otherwise the foundation on which the whole Costing System is built, namely: **"The Time on the Job,"** is at once unreliable and misleading.

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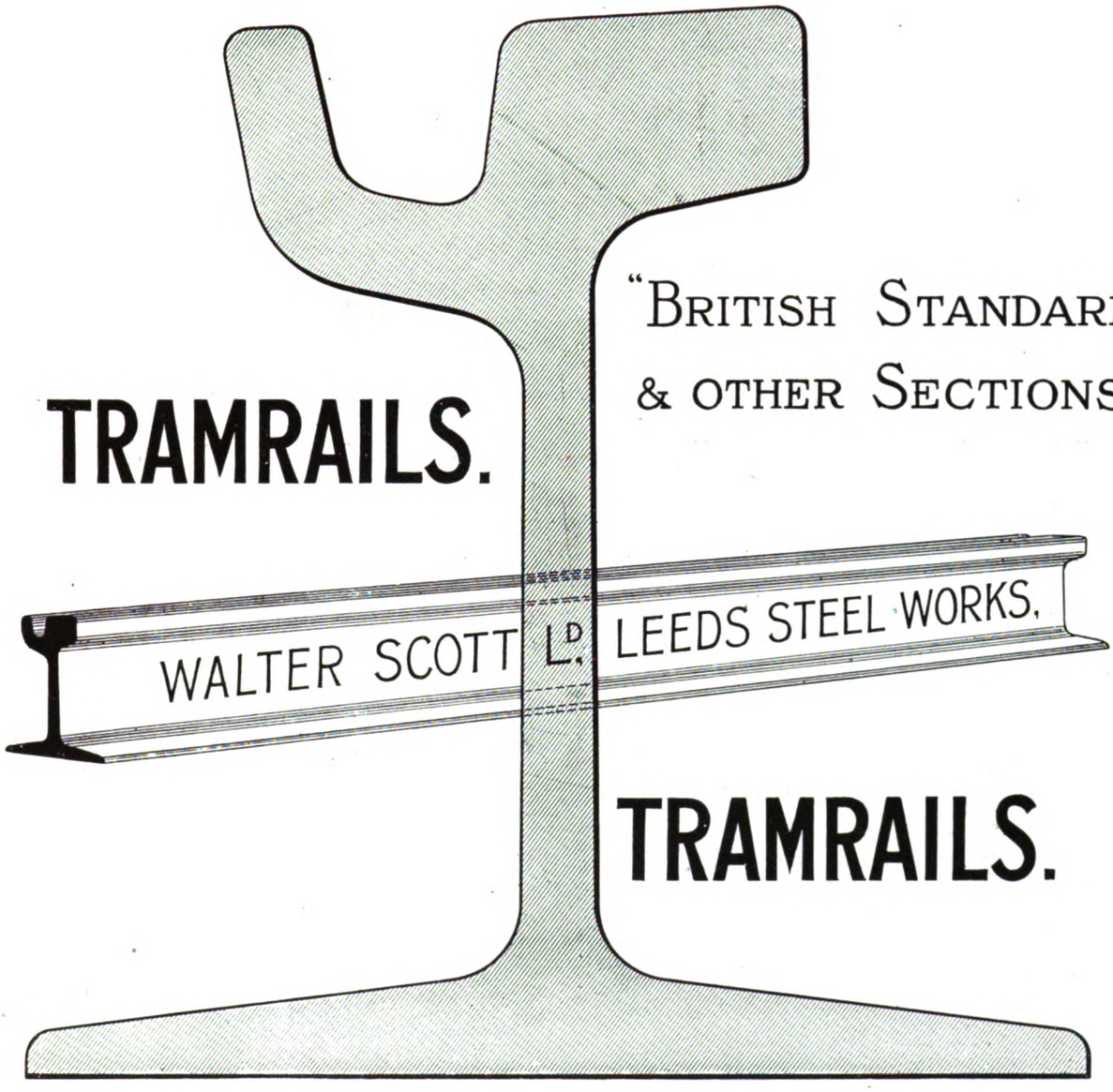

Also Makers of

MILD STEEL BLOOMS, BILLETS, SLABS, FLATS TINBARS & ROUNDS.

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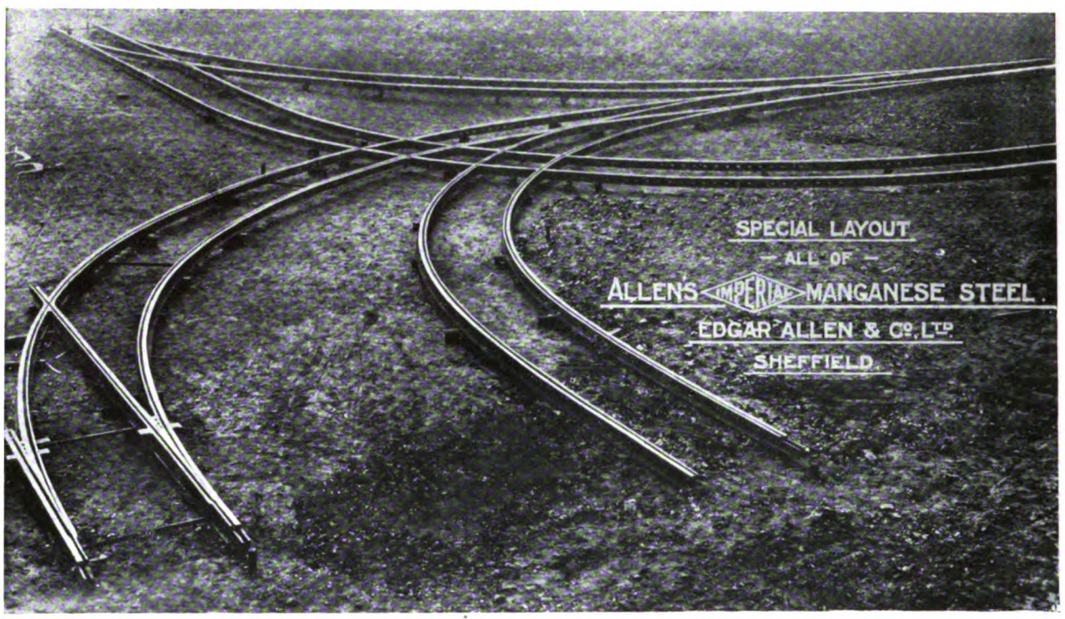
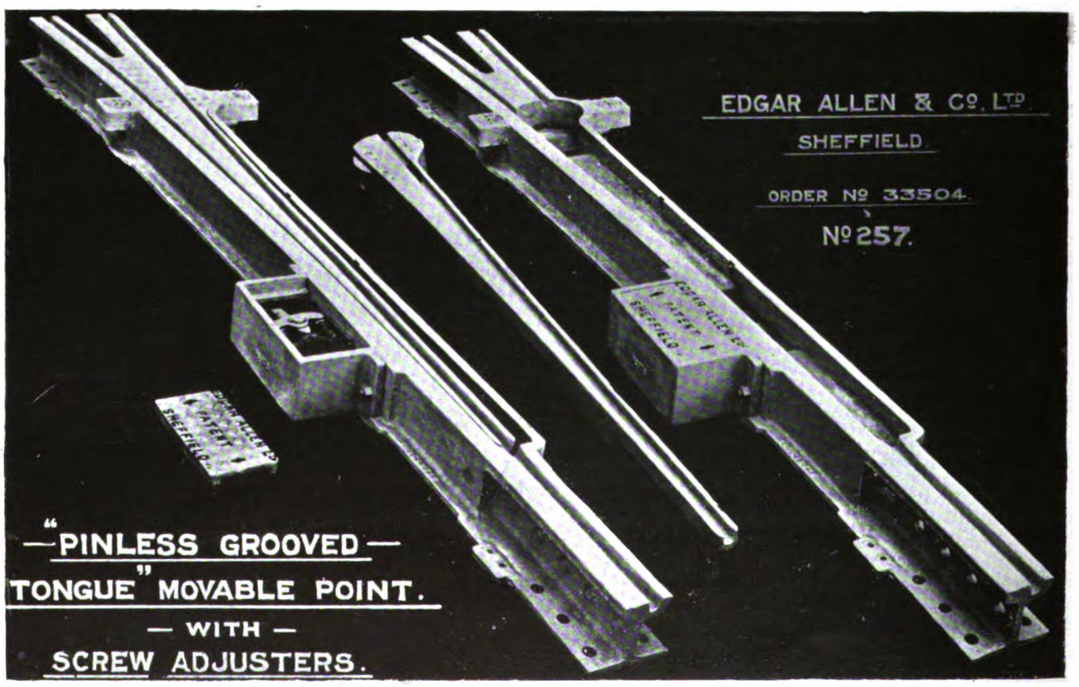


Allen's IMPERIAL Manganese Steel Curves



Allen's Grooved Tongue Point with Heel Adjuster.

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THE TRAMWAY & RAILWAY WORLD.
(REGISTERED AS A NEWSPAPER.)
ESTABLISHED IN 1892.

PRICE ONE SHILLING.

DECEMBER 26, 1914.
Vol. XXXVI., No. 32.

Offices: AMBERLEY HOUSE, NORFOLK STREET, LONDON, W.C.

Telegrams: "TRAMIGRO, LONDON."
Telephone No. 2948 GERRARD.

The Tramway and Railway WORLD

ILLUSTRATED

A REVIEW OF PROGRESS IN *Electric* AND OTHER *Traction.*

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Head Offices—41, OSWALD STREET, GLASGOW; BROAD STREET CHAMBERS, BIRMINGHAM.

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THE BRITISH ABC CO. TRADE MARK LONDON

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The "No-Staff" Brake. PATENTED.

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GERMAN ABC CO. TRADE MARK BERLIN

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THE TRAMWAY AND RAILWAY WORLD.

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Railless Trolley Systems at Brighton and Hove ...
Glasgow Tramway Men in Training (Illus.) ...
Street and Electric Railways in America ...
Portable Grinding Machines for Rail Joints (Illus.) ...
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Darkened London: Does the Risk Justify It?
Progress of the Electric Omnibus ...
The Financial Position ...
Hadfield Research Prize ...
Edinburgh Tramway Lease ...
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Mechanical Transport in Army Service ...
Details of Motor Omnibus Costs at Birmingham, Oldham, Rotherham, Sheffield, Warrington and Wolverhampton ...
Railless Car Costs at Leeds and Bradford ...
Automobile Engineering and the War ...
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Defects in Tramcar Controllers ...
American Electric Railway Associations ...
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Benzol, Alcohol, and Mixtures of these Liquids with Petrol, as Fuels for Internal Combustion Engines (Illus.) ...
The War as the Heavy Motor's Magna Charta (Illus.)
Motor Services in Gloucester District ...
Thornycroft Commercial Vehicles ...
Motor Traffic Notes (Illus.) ...

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Telegraphic Addresses and Telephone Numbers

Of Advertisers whose Announcements appear in the Illustrated Issues of THE TRAMWAY AND RAILWAY WORLD.

NAME OF COMPANY OR FIRM.	ADDRESS.	TELEGRAPHIC ADDRESS.	TELEPHONE NO.
Ackley Brake Co.	50, Church Street, New York City, U.S.A.	Acklebrak, New York	—
Ailsa Oilskin & Rubber Co.	Ailsa Works, Dairy, Ayrshire	Ailsa, Dairy, Ayrshire	—
Allen & Co., Ltd., Edgar	Imperial Steel Works, Tinsley, Sheffield	Allen, Sheffield	917, 365, Sheffield.
Allen & Co., Ltd., Edgar (Tramway Dept.)	Imperial Steel Works, Tinsley, Sheffield	{Askham, Sheffield (Tramway and Machinery)}	913, Sheffield.
Anger Manufacturing and Supply Co., Ltd.	Bank Chambers, Preston, Lancs.	Brakjuster, Preston	1033, Preston.
Anglo Engraving Co., Ltd.	Milford Lane, Strand, London, W.C.	Operameter, Estrand, London	117, 8, 9, Gerrard.
Armstrong, Stevens & Son, Ltd.	Whittall Street, Birmingham	Armstrongs, Birmingham	6148, Birmingham.
Auto-Ticket Printing Co., Ltd.	41, Wapping, Liverpool	Extension, Liverpool	4446, Bank, Liverpool.
Automobile Consolidated Alliance, Ltd.	1, Albemarle Street, London, W.	Autocolim, London	31, 32 and 33 Regent.
Avon India Rubber Co., Ltd.	Melksham, Wilts	Rubber, Melksham	2, Melksham.
Babcock & Wilcox, Ltd.	30, Farringdon Street, London, E.C.	Babcock, London	6470 City (8 lines).
Baker & Co. (Rotherham), Ltd., J.	Brinsworth Iron and Wheel Works, Rotherham	Brinsworth, Rotherham	89 and 435, Rotherham.
Bayliss, Jones & Bayliss, Ltd.	Victoria Works, Monmore Green, Wolverhampton	Bayliss, Wolverhampton	630, Wolverhampton.
Belliss & Morcom, Ltd.	Ledsam Street Works, Birmingham	Belliss, Birmingham	3044, Birmingham.
Bell Punch & Printing Co., Ltd.	52-58, Tabernacle Street, London, E.C.	Osmic, Finsquare, London	7531, Central.
Blackwell & Co., Ltd., R. W.	14, Great Smith Street, London, S.W.	Kurkee, London	4765, Victoria.
Bridgeport Brass Co.	Broadway and Murray Street, New York, U.S.A.	—	—
Brill Co., J. G.	110, Cannon Street, London, E.C.	Axles, London	6018, Bank.
British Ackley Brake and Supply Co., Ltd.	Westinghouse Building, Norfolk Street, London, W.C.	Acklebrusa, Estrand, London	3272, Gerrard.
British Aluminium Co., Ltd.	109, Queen Victoria Street, London, E.C.	Cryolite, London	2676, City (3 lines).
British Berna Motor Lorries, Ltd.	Avonmore Road, West Kensington, London, W.	Britberna, 'Phone, London	4542, Western.
British Insulated & Helsby Cables, Ltd.	Prescot, Lancs	Insulator Prescot	8, Prescot.
British Westinghouse Electric & Mfg. Co., Ltd.	Westinghouse Building, Norfolk Street, London, W.C.	Multiphase, Estrand, London	2461 & 2476, Gerrard.
Brockhouse & Co., Ltd.	Victoria Works, Hill Top, West Bromwich	Brockhouse, West Bromwich	228, West Bromwich.
Brown and Sons (Huddersfield), Ltd.	Park Works, Lockwood, Huddersfield	Gearing, Huddersfield	1080, Huddersfield.
"Cedes" Electric Traction, Ltd.	112, Great Portland Street, London, W.	Cedesmixte, Wesdo, London	6130 Mayfair.
Clay & Atkinson	Bower Street, Bradford		1263, Bradford.
Clayton & Co. (Huddersfield), Ltd.	Union Works, Huddersfield	Karriakar, Huddersfield	1441, 2, 3, Huddersfield.
Clough, Smith & Co., Ltd.	Spencer House, South Place London E.C.	Ciufmit Ave., London	8150, City.
Coan, R. W.	219, Goswell Road, London, E.C.	Krankases, Isling-London	4879, Central; 3846, City.
Commercial Cars, Ltd.	Biscot Road, Luton	Komerkars, Luton	192 and 193, Luton.
Consolidated Accessories Co.	27, Clement's Lane, London, E.C.	Inbrake, Cannon, London	8735, Central.
Continental Tyre and Rubber Co., Ltd.	Thurloe Place, London, S.W.	Pneumique, Southkens, Lndn	4340, Kensington.
Continuous Rail Joint Co., Ltd.	13, Abchurch Lane, London, E.C.	Winby, London	—
Courtenay, J. W., Ltd.	Amberley House, Norfolk Street, W.C.	Tramigro, London	7630, City.
Curzon, Stuart A.	98-100, Victoria Street, London, S.W.	Curzonsold, Sowest, London	7843, Victoria.
Daimler Co., Ltd.	Daimler Works, Coventry	Daimler, Coventry	505, Coventry.
Dennis Bros. (1913), Ltd.	Onslow Works, Guildford	Dennis, Guildford	139 and 339, Guildford.
Dick, Kerr & Co., Ltd.	Abchurch Yard, Cannon Street, E.C.	Dicker, Cannon, London	5866, Bank (4 lines).
Docker Brothers, Ltd.	170, Bishopsgate, London, E.C.	Matured, London	2775, London Wall.
Doulton & Co., Ltd.	Lambeth Pottery, Lambeth, S.E.	Doulton, London	2260, Victoria (5 lines).
Dunlop Rubber Co., Ltd.	Manor Mills, Aston, Birmingham	Elastic, Birmingham	123, East, Birmingham.

(Continued on page iv.)

Some Countries and Colonies represented in

THE PAID SUBSCRIPTION LIST

OF THE

TRAMWAY & RAILWAY WORLD

South Australia	China	Portugal	New Zealand
Bombay Presidency	Burma	Mexico	Peru
Argentine	Holland	Cuba	Russia
Cape Colony	Denmark	Mandalay	Malta
Norway	Belgium	Hong Kong	Greece
Sweden	United States	New South Wales	Brazil
Hawaii	Chili	Straits Settlements	France
Jamaica	Sierra Leone	Victoria	Japan
Italy	Natal	Queensland	Egypt
Rhodesia	Switzerland	Tasmania	Soudan
Canada	Transvaal	Bengal	Etc., etc., etc.

Thanks to the British Navy, communications continue to be unaffected, and **THE TRAMWAY AND RAILWAY WORLD** (Illustrated), in war as in peace, has an International circulation of the greatest value to those who desire to take advantage of the present opportunity to extend their trade connections.

In our Illustrated issues all advertisements are printed on glazed paper, and, as the "British Printer" has well said, "all announcements receive appropriate setting with clear and forcible effects."

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(*Continued from page iii.*)

Telegraphic Addresses and Telephone Numbers

Of Advertisers whose Announcements appear in the Illustrated Issues of THE TRAMWAY AND RAILWAY WORLD.

NAME OF COMPANY OR FIRM.	ADDRESS.	TELEGRAPHIC ADDRESS.	TELEPHONE No.
Edison & Swan United Electric Light Co., Ltd.	Ponders End, Middlesex	Ediswan, Ponders End	530, Enfield. [Central
Electric Construction Co., Ltd.	Dashwood House, 9, New Broad Street, E.C.	Concordance, London	9671, London Wall, and 10934
Electro-Mechanical Brake Co., Ltd.	Eagle Works, West Bromwich	Brakes, West Bromwich	291, West Bromwich.
Equipment & Engineering Co.	Westinghouse Building, Norfolk Street, London, W.C.	Kharparts, Estrand, London	3273, Gerrard.
Estler Bros.	South Molton Road, Victoria Docks, London, E.	Isolable, London	330, East.
Ferranti, Ltd.	Central House, Kingsway, London, W.C.	Ferranti, Westcent, London	1602, Regent
Fodens, Ltd.	Sandbach, Cheshire	Foden, Sandbach	7, Sandbach.
General Electric Co., Ltd.	71, Queen Victoria Street, London, E.C.	Polyphase, London	3600, London Wall.
General Seating Co., Ltd.	13, City Road London, E.C.	Cushioning, Finsquare, Lndn.	6187, London Wall.
Glasgow Numerical Printing Co.	21, Finnieston Street, Glasgow	Tickets, Glasgow	3350, Glasgow
Glenn, J. Barber	Moorgate Station Chambers, London, E.C.	Octet, Ave., London	962, London Wall.
Green & Sons, Ltd., E.	2, Exchange Street, Manchester	Economiser, Manchester	1375, Manchester.
Green & Co. (Feltham), Ltd., Geo. W.	Q-Fel Works, Feltham	Cufel, Feltham	——
Grover & Co., Ltd.	St. Peter's Street, Wharf Road, City Road, N.	Adopted, Nordo, London	617, North.
Hadfields, Ltd.	Hecla Works, Sheffield	Hadfield, Sheffield	750, 2638, & 2638, Sheffield.
Hailey's Industrial Motors, Ltd.	Yoker, Glasgow	Horseless, Glasgow	196 & 197, Clydebank.
Henley's Telegraph Works, Ltd.	13 & 14, Blomfield Street, London Wall, E.C.	Henletel, Ave., London	4560, London Wall.
Hurst, Nelson & Co., Ltd.	Motherwell, Scotland	Nelson, Motherwell	44, Motherwell.
International Pay-as-you-enter Tram. Co., Ltd.	117, Victoria Street, London, S.W.	Pasentecar, London	6513, Victoria.
International Time Recording Co.	151-155, City Road, London, E.C.	Timefactos, London	1639, London Wall.
Kearsley & Co., Ltd., Robt.	Ripon, Yorks	Kearsley, Ripon	5, Ripon.
Leyland Motors, Ltd.	Leyland, Lancs	Motors, Leyland	37, Leyland.
Lorain Steel Co.	36 38, New Broad Street, London, E.C.	Thoughtful, London	8186, London Wall.
Macintosh & Co., Ltd., Chas.	Cambridge Street, Manchester	Macintosh, Manchester	7147, Central, Manchester.
M. and G. Truck and Engineering Co., Ltd.	St. John's House, 124-127, Minories, London, E.	Emgeestock, Ald., London	739, Avenue.
Magnolia Anti-Friction Metal Co., Ltd.	49, Queen Victoria Street, London, E.C.	Magnolier, Cannon, London	6596, City.
Major, Robinson & Co., Ltd.	218, Deansgate, Manchester		5008, Central, Manchester.
Maudslay Motor Co., Ltd.	Parkside, Coventry	Maudslay, Coventry	110, Coventry.
Metropolitan Carriage, Wagon, and Finance Co., Ltd.	Saltley, Birmingham	Metro., Birmingham	6410, Central.
Micanite & Insulators Co., Ltd.	Empire Works, Blackhorse Lane, Walthamstow, E.	Mytilite, Phone, London	32, Walthamstow.
Millars' Timber and Trading Co., Ltd.	Pinners' Hall, London, E.C.	Jarrah, Stock, London	366, London Wall.
Milnes-Daimler-Mercedes, Ltd.	132, Long Acre, London, W.C.	Milnesia, Rand, London	6910, Gerrard.
Mirrlees, Watson Co., Ltd.	Scotland Street, Glasgow	Mirrlees, Glasgow	1781, South Side.
Motor Rail and Tram Car Co., Ltd.	79 Lombard Street, London, E.C.	——	1777, Avenue.
Motor Traction	20, Tudor Street, London, E.C.	Autocars, Fleet, London	2848, City.
Municipal Tramways Association	C. J. Spencer, 7, Hall Ings, Bradford	Tramways, Bradford	2381 & 2382, Bradford
National Electric Construction Co., Ltd.	5, Laurence Pountney Hill, London, E.C.	Overhauled, London	5329, Bank.
Naylor Brothers (London) Ltd.	497, Oxford Street, London, W.	Glossiest, Wesdo, London	926, Paddington.
Nobles and Hoare	Cornwall Road, Stamford Street, London, S.E.	Nobles, Watloo, London	1302, Hop.
Peacock Brake Co.	37, Clement's Lane, London, E.C.	Inbrake, Cannon, London	5735, Central.
Pease & Partners, Ltd.	Tees Ironworks, Middlesbrough	Pease, Middlesbrough	917, Middlesbrough.
Peckham Truck and Engineering Co., Ltd.	34, Broadway, Westminster, London, S.W.	Peckham, Quancham, London	2413, Victoria.
Peter Union Tyre Co.	190-198, Great Portland Street, London, W.	Pneupeter, Wesdo, London	2433, Gerrard.
Phillipson & Co., W.	Holland Street, Astley Bridge, Bolton	Safety, Bolton	147, Eagley.
Pinchin, Johnson & Co., Ltd.	Minerva House, 26 & 27, Bevis Marks, London, E.C.	Pinchin, Ald., London	9916, London Wall.
Polack Tyre and Rubber Co., Ltd.	81 84, Basinghall Street, London, E.C.	Polackump Ave., London	5726, London Wall.
R.E.T. Construction Co., Ltd.	Finsbury Pavement House, London, E.C.	Raillessly, Ave., London	1384, London Wall.
Railway & General Engineering Co., Ltd.	Meadow Works, Nottingham	Dot, Nottingham	19, Nottingham.
Railway Track Supply Co. of Gt. Britain	79½, Gracechurch Street, London, E.C.	Gillfrase, London	930, Bank.
Ruberoid Co., Ltd.	81-83, Knightrider Street, London, E.C.	Ruberoid, Cent., London	1480, Central.
Russell & Sons, Ltd., James	Crown Tube Works, Wednesbury	Russell, Wednesbury	2, Wednesbury.
Scholey & Co., Ltd.	56, Victoria Street, London, S.W.	Scolanco, Sowest, London	6663, Victoria (2 lines).
Shrewsbury & Challiner Tyre Co., Ltd.	Kay Street, Ardwick Green, Manchester	Challiner, Manchester	962, Central, Manchester.
Siemens Brothers Dynamo Works, Ltd.	Tyssen Street, Dalston, London, N.E.	Siemodyn, Kinland, London	8587-8589, Central, and 2440, Dalston
Simplex Conduits, Ltd.	Garrison Lane, Birmingham	Economy, Birmingham	35, Victoria, Birmingam.
Simplex Rubber Co., Ltd.	Scrubbs Lane, Willesden, London, N.W.	Simplexine, Kensal, London	550, Willesden.
Skefko Ball Bearing Co., Ltd.	Skefko Works, Luton	Skefko, Luton	418, Luton.
Smethwick Stamping Co.	Bridge Street, Smethwick	——	——
Smith & Co., Frederick	Anaconda Works, Salford, Manchester	Anaconda, Manchester	2334, Manchester.
Standard Underground Cable Co.	Dock House, Billiter Street, London, E.C.	——	5463, Avenue.
Stevens, Ltd., W. A.	96, Victoria Street, London, S.W.	Petalobus, Vic., London	4939, Victoria.
Stewarts & Lloyds, Ltd.	41, Oswald Street, Glasgow	Lapweld, Glasgow	9660, City.
Strain & Sons, Ltd., Wm.	Belfast	Strain, Belfast	4237, 8, 9, Belfast.
Straker & Squire, Ltd., Sidney	Nelson Square, Blackfriars, London, S.E.	Rhomboidal, London	369, Hop.
Taylor, John	7, Strand Street, Liverpool	Velo, Liverpool	4484 (Bank), Liverpool.
"The Coventry" Chain Co., Ltd.	Spon End Works, Coventry	Chains, Coventry	830, Coventry.
Thermit, Ltd.	27, Martin's Lane, Cannon Street, London, E.C.	Fulmen, Cannon, London	4292, City
Thompson, Joseph	Columbia Works, 106, Eyre Street, Sheffield	Insulator, Sheffield	2774, Sheffield.
Tilling, Ltd., Thomas	Winchester House, Peckham, London, S.E.	——	2814, Hop.
Titan Trackwork Co., Ltd.	Rutland Road, Sheffield	Crossings, Sheffield	798 Central, Sheffield.
Tramways and Light Railways Association	Caxton House, Westminster, London, S.W.	Tralitrayl, Vic., London	2110, Victoria.
Tramway and Railway World	Amberley House, Norfolk Street, W.C.	Tramugro, London	2948, Gerrard.
Tramway Supplies, Ltd.	160, Woodhouse Lane, Leeds	Controller, Leeds	3498 Central, Leeds.
Tudor Accumulator Co., Ltd.	3, Central Buildings, London, S.W.	Subconical, London	2600, Victoria.
Tyne Metal Co., Ltd.	Skinnerburn Road, Newcastle-on-Tyne	Floating, Newcastle-on-Tyne	2943, Newcastle.
Underground Electric Railways Co.	Electric Railway House, London, S.W.	Underneath, Vic., London	5890, Victoria.
United Electric Car Co., Ltd.	Preston, Lancs.	Prescar, Preston	219 & 220, Preston.
Val de Travers Asphalte Paving Co., Ltd.	Hamilton House, Bishopsgate, London, E.C.	Traversable, Ave., London	7467, London Wall.
Valor Co., Ltd.	Rocky Lane, Aston Cross, Birmingham	Valor, Birmingham	252 & 253 East, Birmingham.
Vandervell & Co., C. A.	Warple Way, Acton Vale, London, W.	Vanteria, Act., London	1234, Chiswick.
Wakefield & Co., C. C.	Wakefield House, Cheapside, London, E.C.	Cheery, Cent., London	11305 and 13466, Central.
Walter Scott, Ltd.	Leeds Steel Works, Leeds	Bessemer, Leeds	510, Leeds.
Watlington & Co., Ltd.	Britannia House, 48, Milton Street, London, E.C.	Aetnaco, Barb., London	1257, City (3 lines).
Waygood-Otis, Ltd.	Falmouth Road, London, S.E.	Waygood, Sedist, London	4006, Hop.
Wells, A. C. & Co.	102-104, Midland Road, St. Pancras, London, N.W.	Unbreakable, Kincross, Lndn	341, North.
Westinghouse Brake Co., Ltd.	York Road, King's Cross, London, N.	Westinghouse, Kincross, Lndn	9416, North. [Central.
White & Co., J. G.	9, Cloak Lane, Cannon Street, London, E.C.	Whitterick, Cannon, London	3306, London Wall, and 9686
Williamson, Alfred	North Mill Printing Works, Ashton-under-Lyne	——	320, Ashton-under-Lyne.
Winby & Co., L. P.	13 and 14, Abchurch Lane, London, E.C.	Winby, London	3198, City.
Wolf & Co., S.	115, Southwark Street, London, S.E.	Widerstand, London	5172, Central, and 2774, Hop.
Yarwood & Co., Ltd., John	Bramber Rd., North End Rd., Fulham, London, S.W.	Bernotor, Weakkens, London	4211, Kensington.
Youngs	Ryland Street Works, Birmingham	Oldens, Birmingham	301, Midland.

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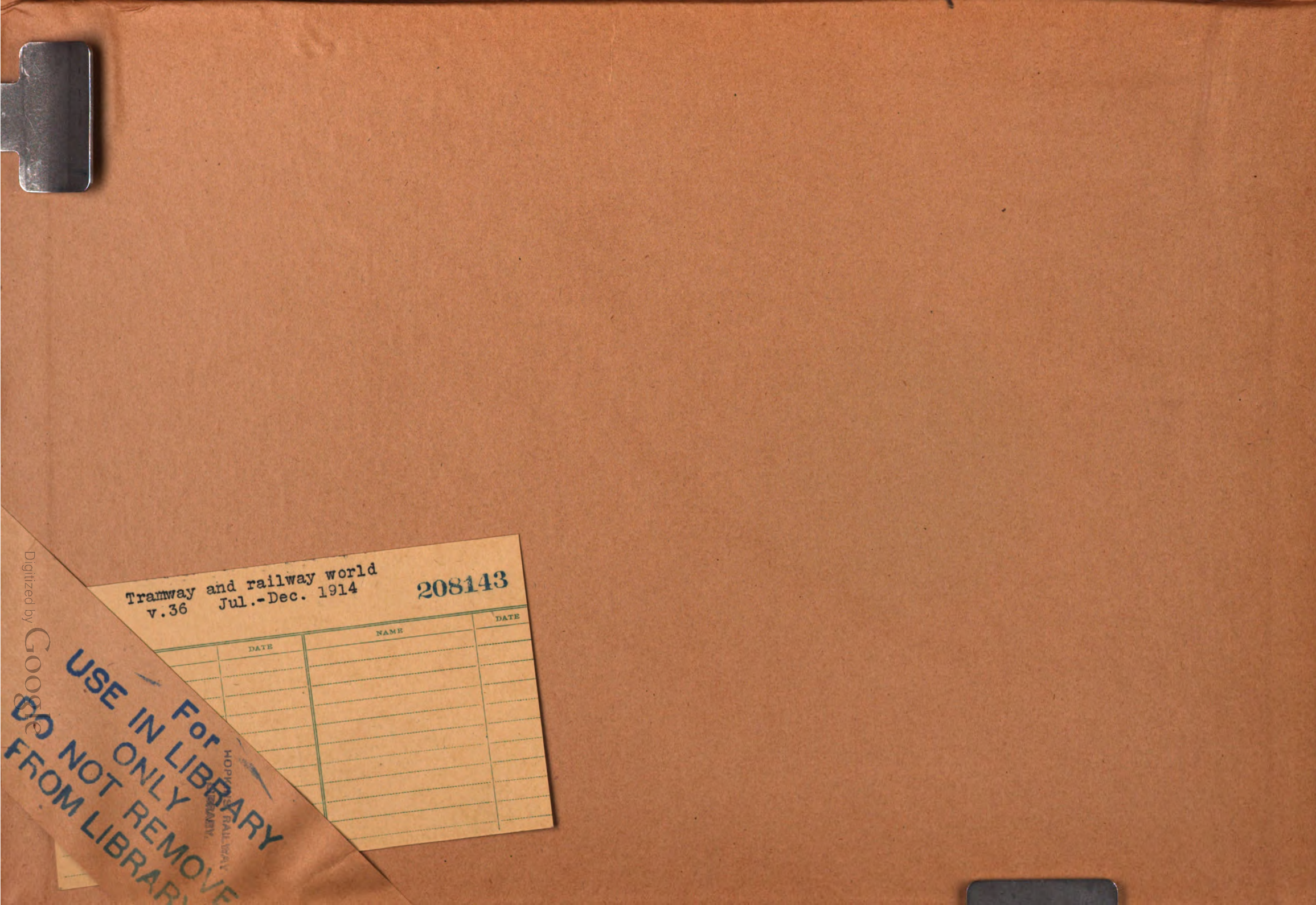
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